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WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS

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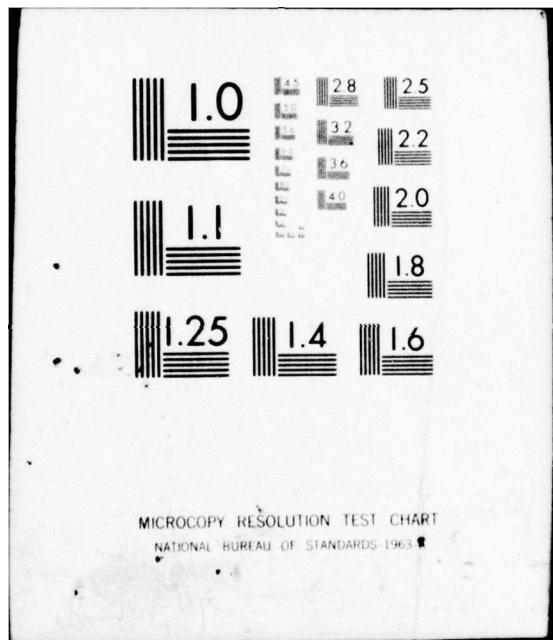
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A COMPILATION OF MOORED CURRENT DATA AND
ASSOCIATED OCEANOGRAPHIC OBSERVATIONS,
VOLUME XI (LATE 1969 MEASUREMENTS)

by

Susan A. Tarbell

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Woods Hole, Massachusetts 02543

May 1976

TECHNICAL REPORT

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Department of Physical Oceanography

ABSTRACT

Summaries of wind and current observations from moored stations gathered in late 1969 by magnetic tape recording current meters and wind recorders are presented, also selected hydrostation data from the same areas.

Averaged wind and current variables are presented in computer generated output as basic STATISTICS, SPECTRA diagrams, PROGRESSIVE VECTOR diagrams and EAST-NORTH component plots. The hydrostation data are presented as temperature and salinity values plotted against depth.

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TABLE OF CONTENTS

	Page
PREFACE	v
ACKNOWLEDGMENTS	vi
Data Location	vii
Hydrocast Data Selection	x
Current Meter Data Selection	x
Clock	xiv
Back Up Clock Information	xiv
SHEAR TIME	xv
Data Editing	xv
Data Presentation	xvi
Mooring Summary	xvi
Data Summary	xvii
Computer Programs	xvii
 Mooring 301	 1
3011	3
3014	7
 Mooring 302	 11
3021	13
 Mooring 304	 17
3041	19
 Mooring 305	 23
3051	25
 Mooring 309	 29
3091	31
3093	35
3095	39
3096	43
 Mooring 310	 47
3101	49
3102	53
3103	57
3104	61

TABLE OF CONTENTS (cont.)

	Page
Mooring 311	65
3116	67
Mooring 314	71
3141	73
3143	77
Mooring 317	81
3171	83
3173	87
3174	91
3175	95
3176	99
Mooring 318	103
3181	105
Hydrographic Data	110
References	128

PREFACE

This volume is the eleventh of a series of Data Reports intended to present, in summarized form, measurements collected from moored ocean stations. The following is a list of preceding reports.

Volume 1 - Webster and Fofonoff	Data from mid 1963
Volume 2 - Webster and Fofonoff	Data from XII-'63 to V-'64
Volume 3 - Webster and Fofonoff	Data from mid 1964
Volume 4 - Pollard	Data collected in 1965
Volume 5 - Tarbell and Webster	Data collected in 1966
Volume 6 - Tarbell	Data collected in 1967
Volume 7 - Chausse and Tarbell	Data collected in 1968
Volume 8 - Pollard and Tarbell	Array data from 1970
Volume 9 - Tarbell, Briscoe and Chausse	IWEX data from 1973
Volume 10- Tarbell	Data collected in early 1969

The back-up recovery system designed in 1968 (Berteaux and Heinmiller, 1969, W.H.O.I. Ref. 69-7 (unpublished manuscript)) proved its worth in 1969. Tests of wire samples and wire in moorings were continued in 1969. The Gulf Stream went through Site D in April resulting in fish bite damage and a re-evaluation of mooring lines and anchor weights. A change from mechanical clocks to crystal clocks was started at the end of the year.

ACKNOWLEDGMENTS

Unfortunately it is impossible to acknowledge individually everyone who gave support to the Moored Buoy Program in any given year. Ideas from any source are valuable to a growing project and of course the skills of the project support personnel are invaluable. As the Project expanded, more people became involved and specialization started to divide the group into segments. The basic groups became oriented around Instrumentation, Engineering, Operations, Data Processing and of course, the glue that holds us all together, Science.

The instrumentation group became responsible not only for maintaining the instruments but also for improving them and designing equipment to test them for the various malfunctions seen in the lab and in the data.

The engineers design and test new mooring configurations and components to meet more demanding scientific needs.

The operations personnel are also the sea-going personnel. They set and retrieve the moorings and maintain all the equipment necessary for these operations as well as the individual mooring components.

The data processors decode the data and edit out known problems, then arrange the data into forms used by the scientists to interpret the data.

The scientists devise the experiments that the Buoy Group handles and evaluate the returning data.

It is the splendid cooperation among these groups that makes the Buoy Group successful and this Data Report necessary.

The patience and skill of Audrey Williams, who typed the text and tables for this report and of Ann Whitlatch, who prepared the computer plots, is greatly appreciated.

Data Location

The data collected in 1969 were gathered from four different sites: the Mediterranean Sea, the Gulf Stream, Site L and Site D. Mooring 289 was set in the Mediterranean at $38^{\circ} 01'N$, $04^{\circ} 59.9'E$; moorings 304 and 305 were Gulf Stream moorings at $36^{\circ} 23.4'N$, $70^{\circ} 00.2'W$ and $36^{\circ} 43'N$, $70^{\circ} 00.3'W$ respectively. Mooring 314 was set at Site L at $34^{\circ} 02.7'N$, $70^{\circ} 02'W$. The rest of the data were collected from moorings set in the vicinity of Site D, $39^{\circ} 10'N$, $70^{\circ} 00'W$. See figures 1 and 2 for positions of the moorings relative to land.

This report presents data from the later part of 1969. For data from early 1969 see W.H.O.I. Ref. 76-40 (unpublished manuscript).

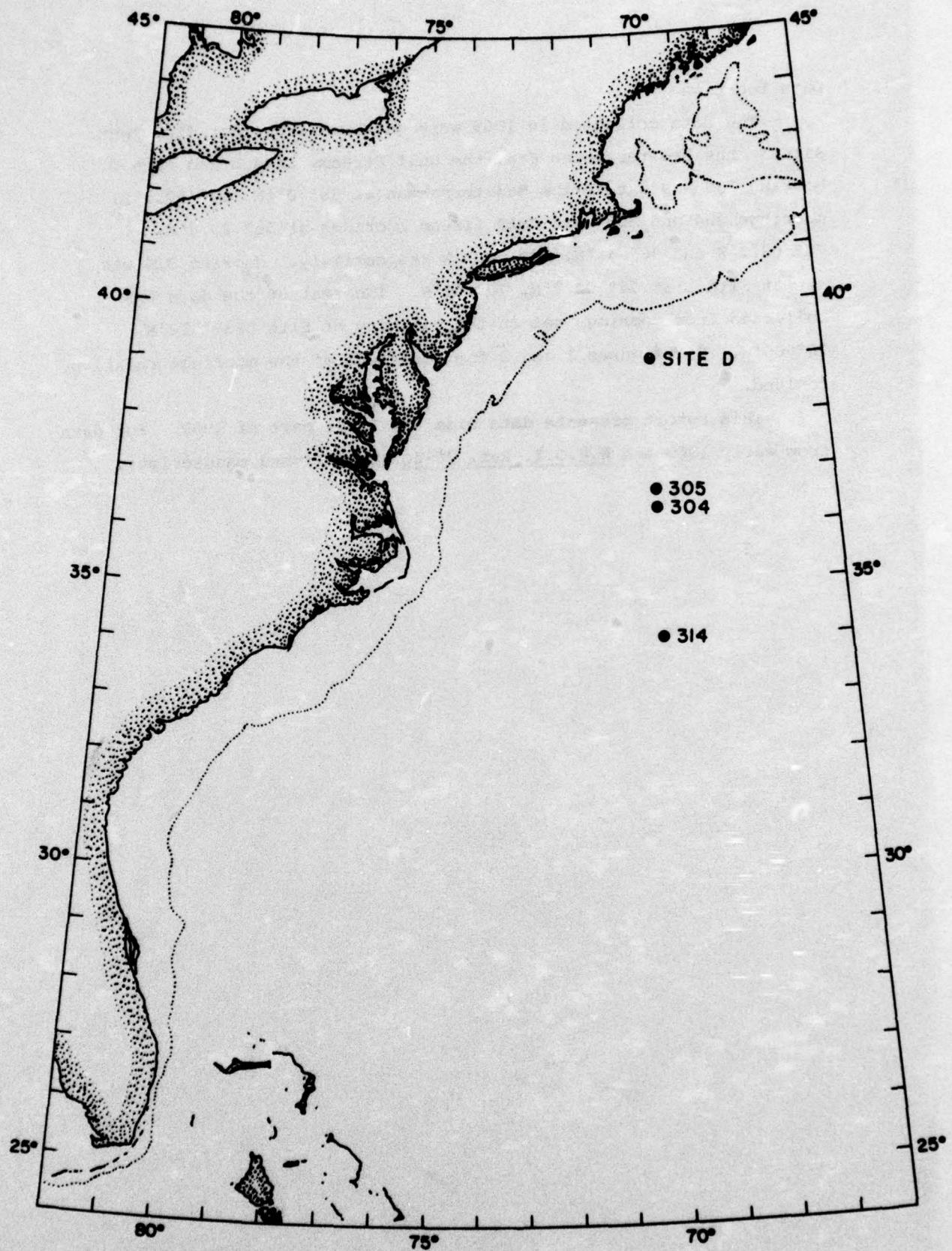


Figure 1 Mooring Sites in N.W. Atlantic

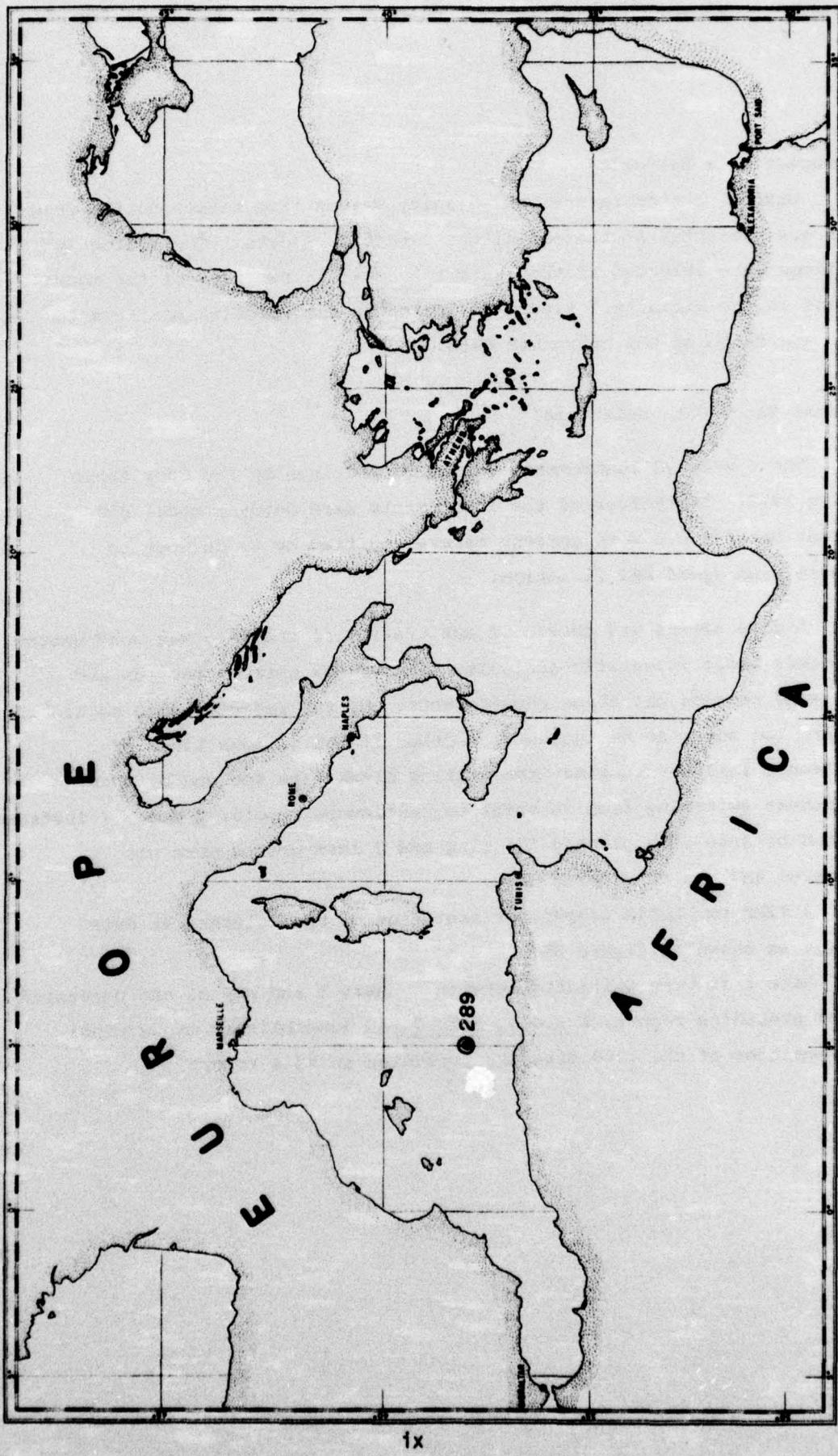


Figure 2 Mooring Site in Mediterranean Sea

Hydrocast Data Selection

Graphs of temperature and salinity values from Nansen bottle readings are presented at the end of the directional data. The hydrographic stations were selected if they were taken within two days of the mooring period in the vicinity. Figure 3A indicates the relative position in time and depth of the hydrocast data.

Current Meter Data Selection

There were 72 instruments set on 35 moorings by the Buoy Group during 1969. Sixty-four of the instruments were Geodyne model 850 current meter and 8 were current meters modified by Woods Hole to measure wind speed and direction.

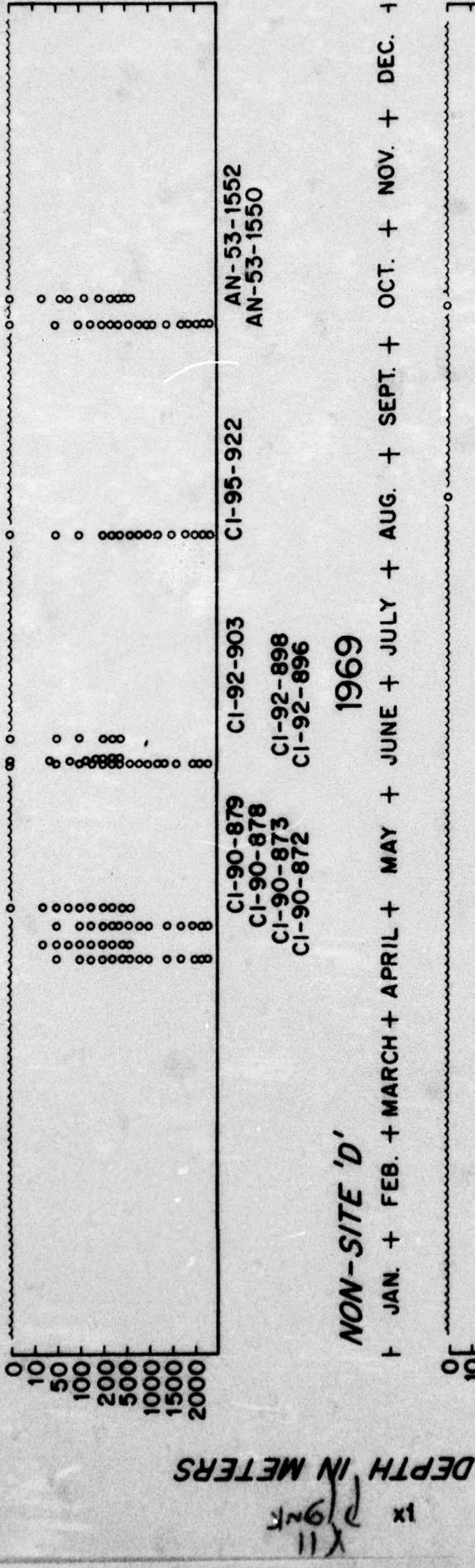
A data series was chosen if the quality of the data was good enough to permit basic scientific analysis. Thirty-six current records and five wind records met these requirements. Of the rejected data series, 12 were too short to be included; another 11 had various kinds of electronic failures ranging from writing blank tape for one bits to instrument switching from interval to continuous recording mode; 1 instrument flooded because of a pinched 'O' ring and 7 instruments were not recovered and are considered lost.

A TIME vs. DEPTH graphic presentation of the selected 41 data records is shown in figure 3B.

Data that were initiated between January 1 and May 31 are presented in the preceding report, W.H.O.I. Ref. 76-40 (unpublished manuscript). The remainder of the 1969 data are presented in this report.

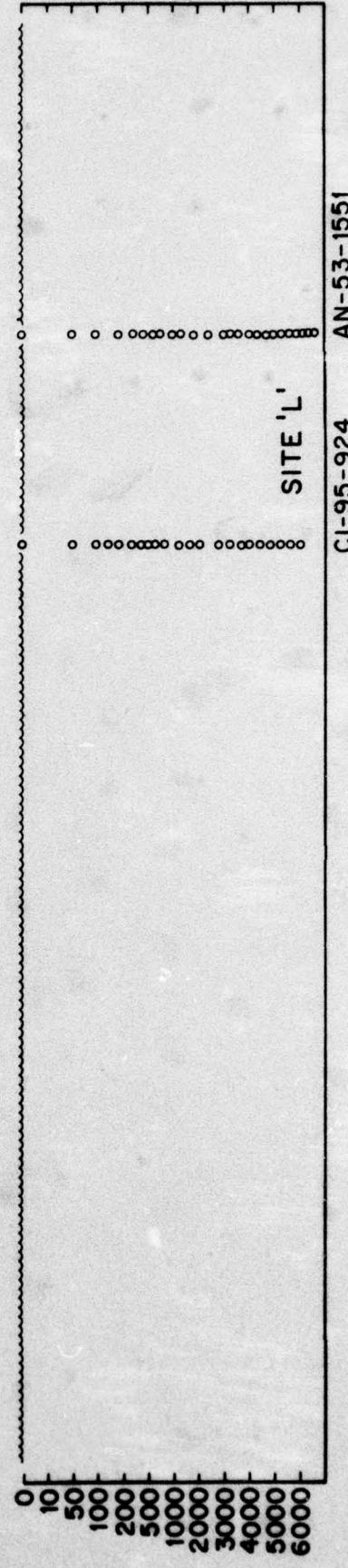
SITE 'D' 39°10'N 70°00'W
↑ JAN. + FEB. + MARCH + APRIL + MAY + JUNE + JULY + AUG. + SEPT. + OCT. + NOV. + DEC. ↑

1969



NON-SITE 'D'

↑ JAN. + FEB. + MARCH + APRIL + MAY + JUNE + JULY + AUG. + SEPT. + OCT. + NOV. + DEC. ↑

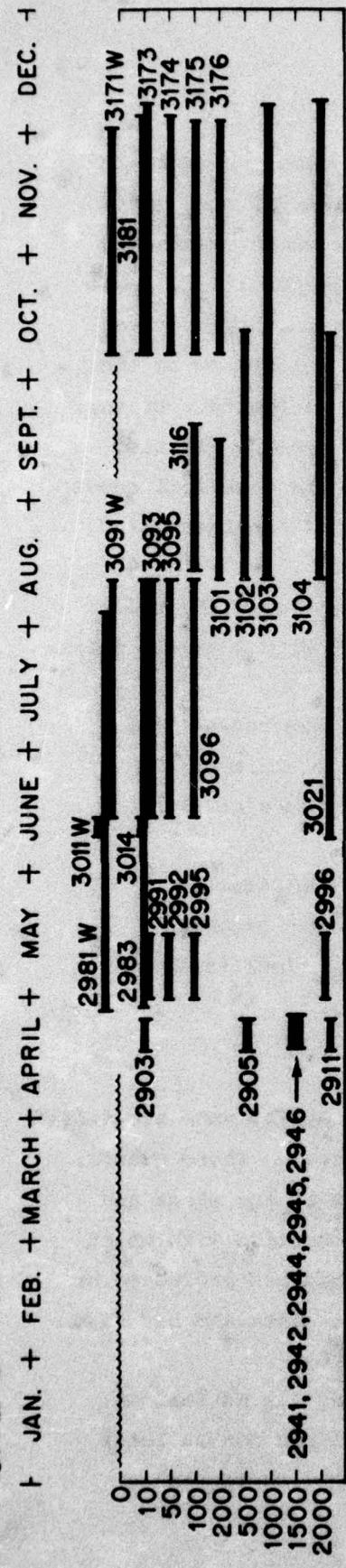


SITE 'L'
CI-95-924 AN-53-1551

W.H.O.I. Ref. 76-40
W.H.O.I. Ref. 76-41

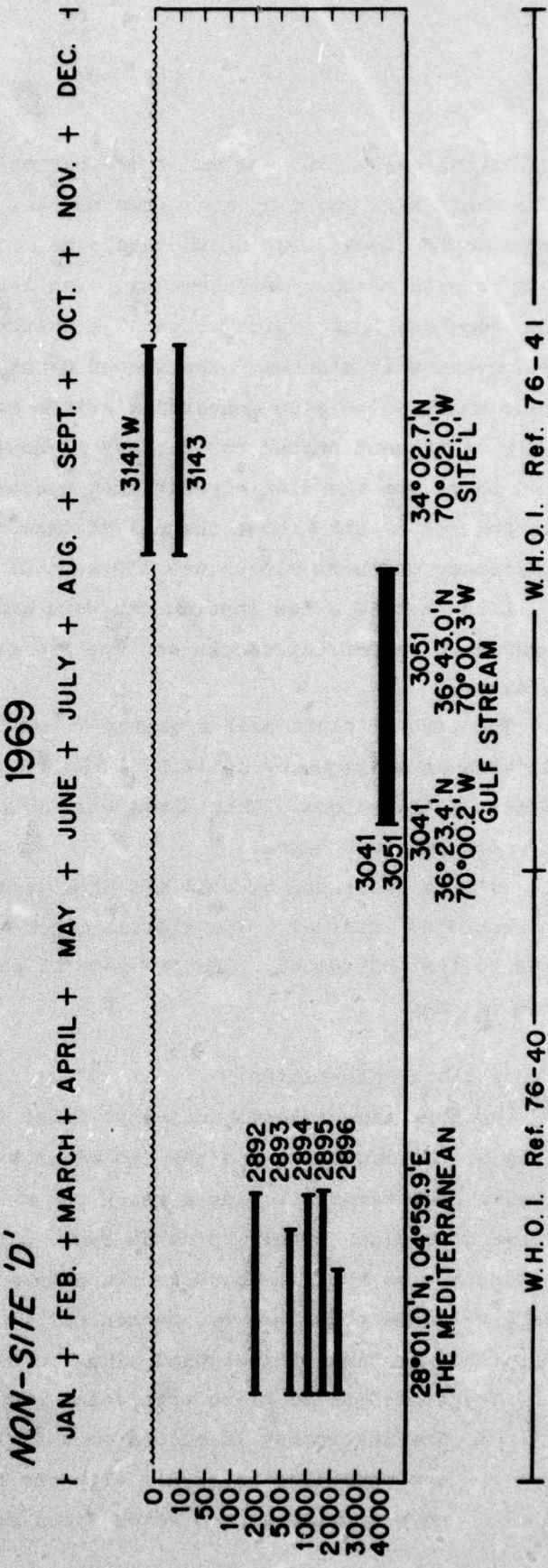
Figure 3A Selected Hydro Stations Collected near Mooring and Plotted According to Date and Sensor Depth

SITE 'D' 39°10'N 70°00'W



DEPTH IN METERS

x111



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Figure 3B Wind and Current Meter Data Duration Plotted According to Time and Sensor Depth

Clock

During early 1969 the model 850 current meters used two mechanical clocks which were wound up every two minutes by a solenoid, similar to an automobile clock. One of these clocks made 1-hour measurements and the other made 12-hour measurements. The 1-hour clock had a 4 lobe cam on the one-hour shaft which actuated a switch to turn on the recording sequence every 15 minutes. The second clock had a one lobe cam on the 12-hour shaft which also actuated a switch to insert in the data train, a 4 bit instrument number to identify 12-hour record cycles. It also served to re-arm the stop circuit that operates when the tape foil comes up at the end of the second channel of tape to shut off the instrument. The accuracy of these clocks was ± 10 seconds per day.

Late in 1969 a few instruments were modified replacing the two asynchronous mechanical clocks and one R-C oscillator with a single quartz oscillator.

The crystal clock uses a quartz crystal as the time source. It oscillates at a frequency of 74.5654 kHz which drives a chain of 42 divide-by-2 flip-flops. This makes available output pulses at rates up to once per 2048 hours.

Time is indicated by a 14 bit time word at the beginning of each recording interval. The digital clock also provides clocking pulses to the instrument. The accuracy of the digital clock is ± 1 second per day.

Back-up Clock Information

Another time-related activity, first tried in April, puts artificial events at the beginning and the end of each data record. These events, at known real times, provide a check on the accuracy of the clock and in case of a clock problem provide back-up time information with which the accuracy of the time base can be determined. This has proved to be a very valuable procedure for mechanical clock instruments and has also simplified the task of assigning times to data records.

The procedure to place artificial events on tape is as follows:

- A) The instrument is turned on and allowed to run for at least two recording intervals with its rotor taped so it cannot move causing a zero rotor speed on tape.

- B) During the recording cycles of two succeeding records untape the rotor and spin it to cause a speed spike.
- C) Tape the rotor again until just before launch causing more zero rotor speeds.
- D) Do not turn either the clock or the recording part of the instrument off between events and launching.

The reverse procedure applies to the recovery of instruments.

The time when the instrument started recording and the times of the rotor spins are recorded according to radio time signals from stations WWV or CHU.

This procedure also is useful with digital clock instruments in cases where the oscillator is correct but the clock word is malfunctioning.

SHEAR TIME

A program called SHEAR TIME was devised to establish best estimates of time for continuous 850 C. M. data. First, provisional linear corrections for the large clock drift rates (minutes per day) were applied, then the intervals between clock switch closures were displayed graphically. The time rate could then be adjusted with as many linear rate changes as needed to smooth the variations in the switch closures. SHEAR TIME was only used on continuous 850 current meter data which used mechanical clocks for a time base.

Data Editing

Data from both the old mechanical clock model 850 and the new crystal clock model 850 are recorded on 1/4" magnetic tape. The data were transcribed onto computer compatible 7-track tape using a PDP-5 computer (manufactured by Digital Equipment Co.). The data were then converted to Maltais format (J. Maltais, 1969) on 9-track magnetic tape.

Once the data are on tape in Maltais format, various types of editing can be done such as replacing values that are obviously bad or removing systematic instrumental errors. After the data have been edited they are vector averaged over each recording interval to give one velocity vector per interval. These vectors are listed in terms of speed and direction. The launch and retrieval transients are truncated and any remaining bad points are deleted and replaced by linearly interpolated values. The result is an evenly spaced time series called the best basic vector averaged series which is used as input for all further processing.

To insure that each data series has a unique identifier, a set of informal guidelines has been established. For example, 2981WL900

298 - The first three digits are the mooring number.

1 - The fourth digit indicates the position of the instrument on the mooring counting from the top down.

W - When present "W" signifies a wind recorder, a "Y" would signify that the data has been read by eye.

L - Indicates that some editing has been done. The amount of editing done can usually be inferred by the position of the letter in the alphabet. If no editing has been done the symbol \$ is used.

900 - The averaging interval, 900 seconds. 1H would indicate a 1-hour averaging interval.

Data Presentation

Data from wind and current recording instruments are presented first, followed by a section of selected hydrostation data.

The data from each mooring follow a two-page description of that mooring. The data from each selected series are presented with 1 page of instrument information and 3 pages of data displays.

Mooring Summary

The first page of the mooring summary is a diagram of the mooring. The second page contains general information on the mooring. For more detailed information on the moorings set in 1969 see G. Volkmann, 1970, W.H.O.I. Ref. 70-37 (unpublished manuscript).

The mooring page uses the following:

*	data presented
M.C.M.	magnetic tape recording current meters
M.W.R.	magnetic tape recording wind recorders
Tens.	tensiometer
Tel. Tens.	telemetering tensiometer
D.R.	depth recorder
Temp.	temperature recorder
Volt. Dig.	voltage digitizer
Vib/Ten	tensiometer with accelerometer added to measure vibration
Press. Rec.	pressure recorder

Data Summary

The first page of the data summary lists the main features of the data series collected from that instrument. The type of instrument, the sampling scheme, and the timing of the sampling are listed as are the start and stop times of the useable data. All times are Greenwich Mean Time. If the instrument did not work properly, comments on its behavior and the data quality are written under the comments section. Some standard statistical parameters are calculated for the data and are presented on the bottom of the first page. The formulas used to calculate the statistical parameters and descriptions of the various plots used to present the data on the following three pages are described below.

Histograms

Histograms of speed are plotted. The plots may be thought of as approximations to the probability density functions. The vertical axis labeled "relative frequency per unit cell width" shows the percentage of the total record that occurred within a given interval of the horizontal axis. The area under the curve equals 100%.

Statistics (STATS)

Standard statistical parameters are calculated for data in the time range given at the bottom of the table. If there are n speed and direction values in a sample, and we define $E_i = s_i \sin\theta_i$, $N_i = s_i \cos\theta_i$, then for $A = E$, N , and s ,

$$\text{mean, } \bar{A} = \frac{1}{n} \sum_{i=1}^n A_i$$

$$\text{variance, } \sigma_A^2 = \frac{1}{n} \sum_{i=1}^n A_i^2 - \bar{A}^2$$

$$\text{standard error of the mean} = \frac{\sigma_A}{\sqrt{n}}$$

$$\text{standard deviation} = \sigma_A$$

$$\text{skewness} = \frac{1}{\sigma^3 A} \left[\frac{1}{n} \sum_{i=1}^n A_i^3 - \frac{3\bar{A}}{n} \sum_{i=1}^n A_i^2 + 2\bar{A}^3 \right]$$

$$\text{kurtosis} = \frac{1}{\sigma^4 A} \left[\frac{1}{n} \sum_{i=1}^n A_i^4 - \frac{4\bar{A}}{n} \sum_{i=1}^n A_i^3 + \frac{6\bar{A}^2}{n} \sum_{i=1}^n A_i^2 - 3\bar{A}^4 \right]$$

The program also computes "East and North" statistics,

$$\text{covariance}, M = \frac{1}{n} \sum_{i=1}^n E_i N_i - \bar{E} \bar{N}$$

$$\text{standard deviation of covariance}, \sigma_m = \sqrt{\frac{1}{n} \sum_{i=1}^n (E_i N_i)^2 - \bar{E}_i \bar{N}_i^2}$$

$$\text{standard error of covariance} = \frac{\sigma_m}{\sqrt{n}}$$

$$\text{correlation coefficient}, M' = \frac{M}{\sigma_E \sigma_N}$$

STATS also computes these parameters related to vector quantities:

the scalar amplitude of the vector mean, $v_m = \sqrt{\bar{E}^2 + \bar{N}^2}$; vector variance,

$$v_v^2 = \frac{1}{2} (\sigma_E^2 + \sigma_N^2); \text{ standard deviation} = v_v.$$

East vs. North Scatterplot

The EAST and NORTH components are plotted against each other to give a pictorial indication of the DIRECTION and SPEED of the velocity vectors. This type plot can be helpful in finding instrument malfunctions and characteristics not easily noticed elsewhere.

Progressive Vector Diagram (PROVEC)

The EAST and NORTH progressive displacements are computed from the SPEED and DIRECTION values of one recording cycle. The plot begins with

an asterisk (*) on a day boundary. All following day boundaries are indicated with a (+). This type of plot accentuates very low frequency events at the expense of higher frequency oscillations which may be hidden by a large amplitude low-frequency current.

Variable vs. Time Plot

This is a diagram of EAST and NORTH components plotted as a function of TIME. The plot is generated from the basic vector averaged series. This type of plot is complementary to the PROGRESSIVE VECTOR diagram since it accentuates higher frequency events such as inertial and tidal oscillations.

Spectra

The program TIMSAN (Time Series Analysis) uses the Fast Fourier Transform algorithm of Singleton (1969) and is restricted to data segments of length N points, where N must contain no prime factor larger than 5, and must be less than 8000 points; data series longer than this must be broken into two or more pieces.

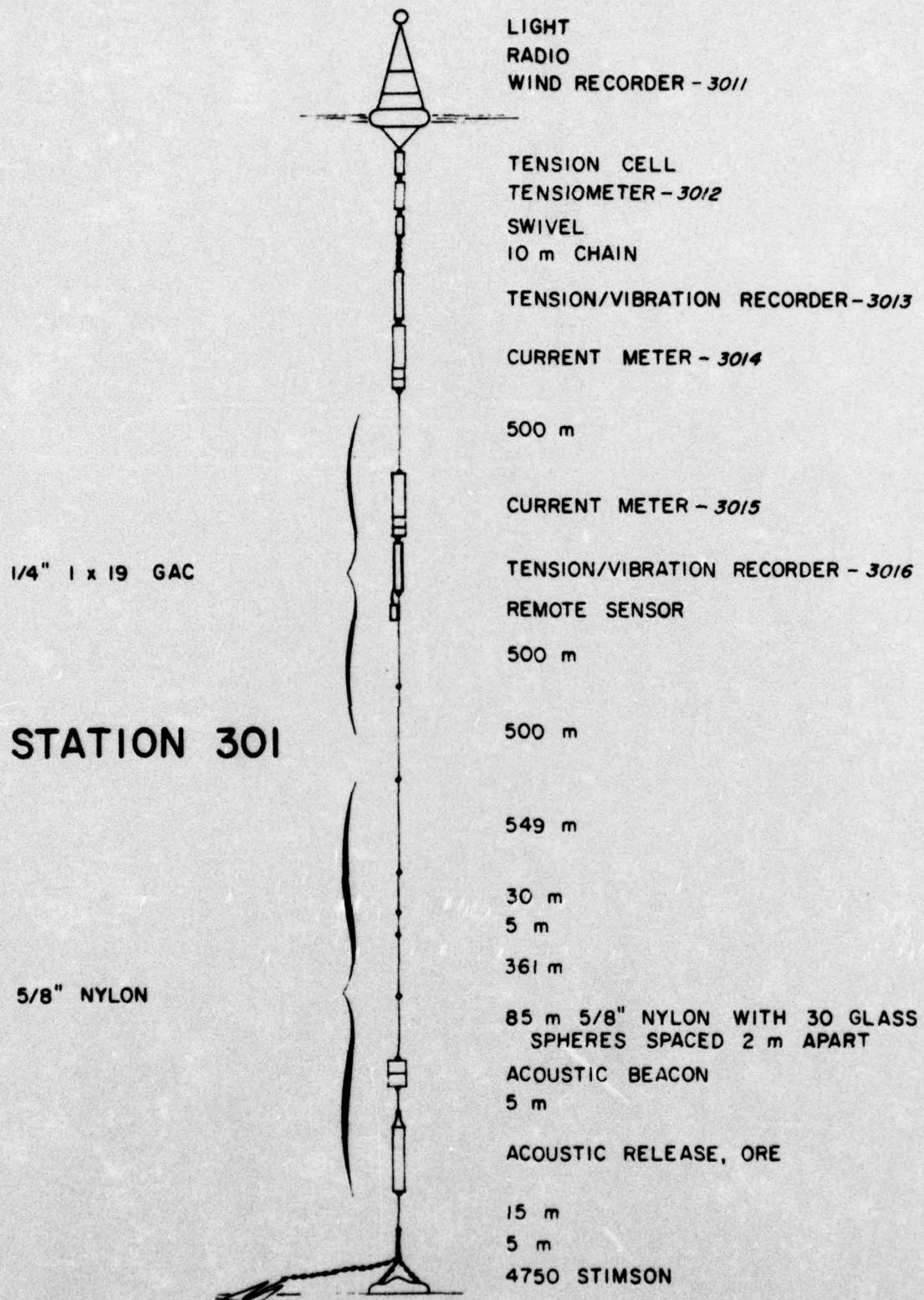
The number of degrees of freedom for the first 40 plotted points is given by $v = a m s$ where m is the number of adjacent frequency bands being averaged as stated in the label, s is the number of independent data pieces being averaged, again as stated in the label, and a should be two for temperature spectra and for Horizontal Kinetic [HKE] spectra for which the EAST and NORTH components seem statistically independent. In the absence of information regarding NORTH-EAST correlation, one should use $a = 2$ to be safe.

The log-log plot is further averaged during plotting so that more and more points are averaged together as frequency increases. This eliminates the bunching together of points at high frequencies, increases the degrees of freedom of the high frequency estimates, and still permits low-frequency resolution. The averaging algorithm is as follows: counting from the left of the plot, the first 40 plotted points represent data that has been averaged as stated in the label; the data for the next 15 plotted points has been averaged over twice as many frequency bands;

the next 6 over five times as many, the next 40 over ten times as many, the next 15 over twenty times as many, the next 6 over fifty times as many, the next 40 over 100 times as many and so on. In this way, for example, 7900 data points with no averaging indicated in the label would be plotted as only 176 points, and the last 14 estimates would be averaged over 200 basic frequency bands. The m in the formula $v = a m s$ for degrees of freedom is, in this example, 200 times larger at the highest frequencies than at the lowest frequencies.

For $v > 30$, the confidence limits for the spectral estimates are given approximately by $(1 - 2/9v \pm z\sqrt{2/9v})^{1/2}$, where $Z = 1.28375$ for 80% confidence limits, $Z = 1.645$ for 90%, $Z = 1.96$ for 95% and $Z = 2.5757$ for 99%. In the example above, if the HKE spectral plot label had indicated 2 pieces and averaging over 8 adjacent frequency bands then $v = 2 \times 2 \times 8 = 32$ for the lowest 40 frequencies (assuming NORTH and EAST components are highly correlated) and $200 \times 32 = 6400$ for the highest frequencies. The 95% confidence intervals (i.e., 95% of the time one would expect the spectral estimates to vary no more than this much) would be (0.57, 1.55) at low frequencies, and (0.97, 1.03) at high frequencies.

For $v \leq 30$, one must obtain confidence intervals from Chi-Squared distribution tables in standard statistical references.



Mooring No. 301

Set 69 June 07 39° 09.9N 69° 56.0W
Year Month Day Latitude Longitude

Set by J. Gifford Ship R. V. Chain Cruise 92

Retrieved 69 June 11
Year Month Day

Retrieved by J. Gifford Ship R. V. Chain Cruise 92

Purpose of Mooring: Instrumentation test

Mooring Type: Surface mooring - toroid

<u>Data Number</u>	<u>Instrument Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3011*	W-169X	M.W.R.	0	
3012	2001	Tens.	2	
3013	2	Vib/Ten	13	
3014*	M-198	M.C.M.	16	
3015	M-212	M.C.M.	517	No data, electronic problems
3016	3	Vib/Ten	518	
Water depth			2680	

COMMENTS ON MOORING:

Data number 3011

Instrument No.: W-169X

Type: Magnetic tape wind recorder

Depth: 0 m

Water depth: 2680 m

Start time: 69-VI-07 121735

Stop time: 69-VI-11 171735

Duration: 4d 5h

Sampling scheme: Continuous

one reading every 5 seconds

COMMENTS:

Wind direction follows ocean current conventions to facilitate comparisons; add 180° to direction for meteorological reading.

STATS

	EAST	NORTH
MEAN	-4.60	-24.94
STD. ERR.	.81	1.42
VARIANCE	793.97	2450.87
STD. DEV.	28.17	49.50
KURTOSIS	2.90	2.98
SKEWNESS	-.50	.00

DATA/ 3011WE300

SPEED	M	MM/MIN	EAST	&	NORTH	M	MM/MM
57.80	=	COVARIANCE				483.50	
.67	=	STD. ERR. OF COVARIANCE				47.05	
543.93	=	STD. DEV. OF COVARIANCE				1888.91	
23.32	=	CORRELATION COEFFICIENT				.353	
2.31	=	VECTOR MEAN				25.98	
.34	=	VECTOR VARIANCE				1828.02	
	=	STD. DEV.				40.92	

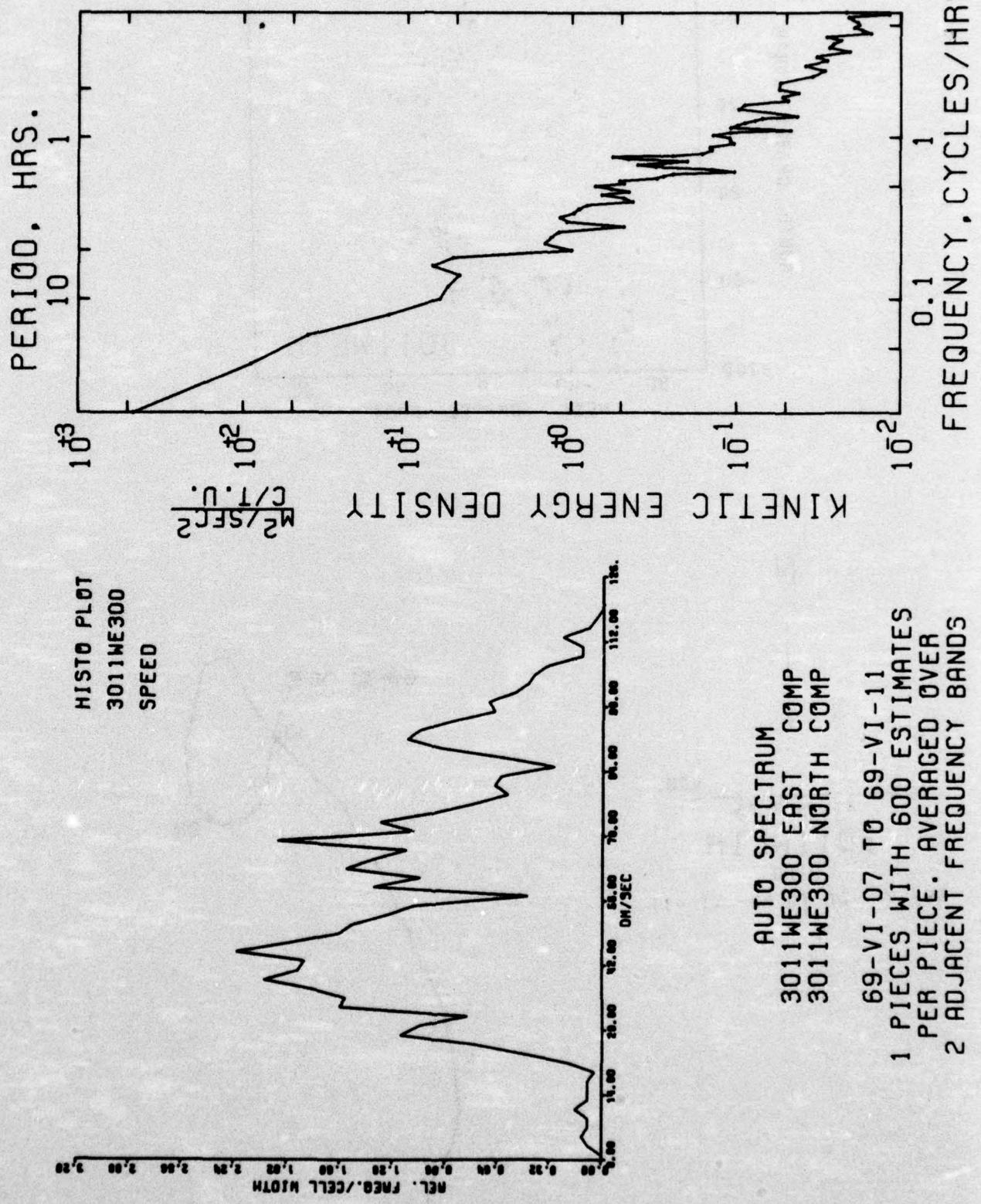
UNITS OF RAW DATA VARIABLES = DM/SEC

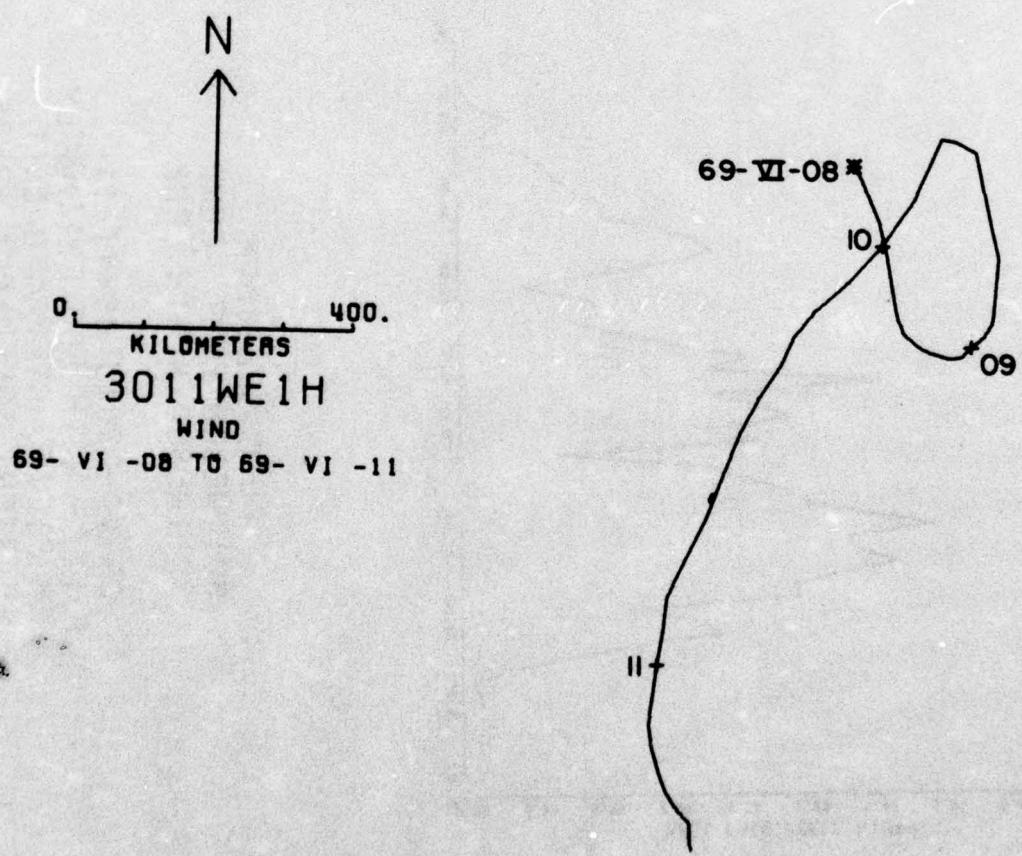
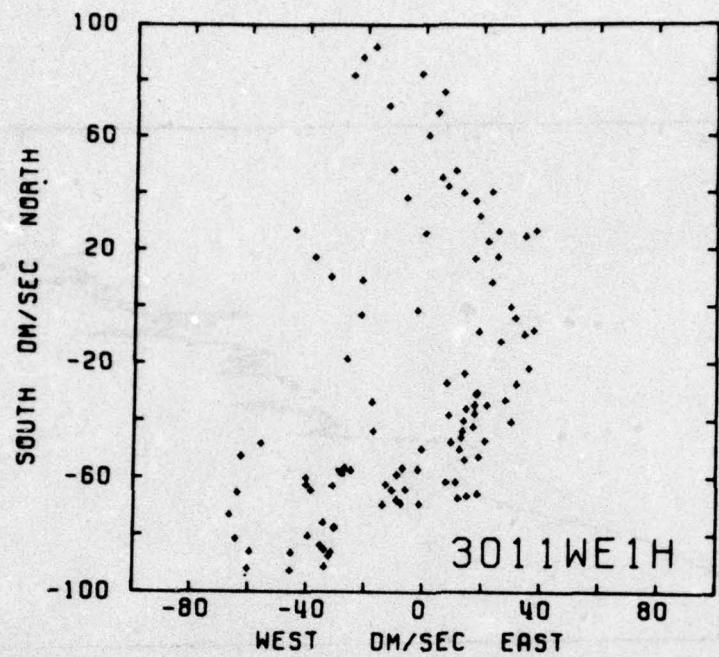
SAMPLE SIZE = 1213 POINTS

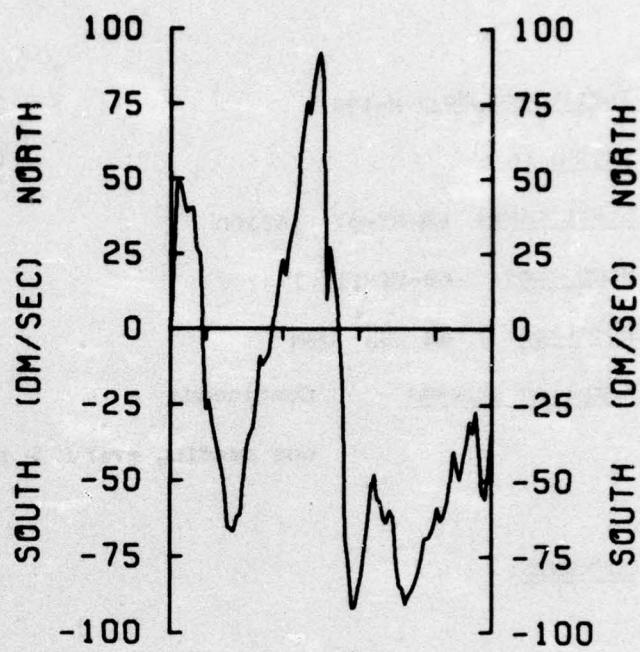
SPANNING RANGE

FROM 69- VI -07 12.17.35
TO 69- VI -11 17.17.35

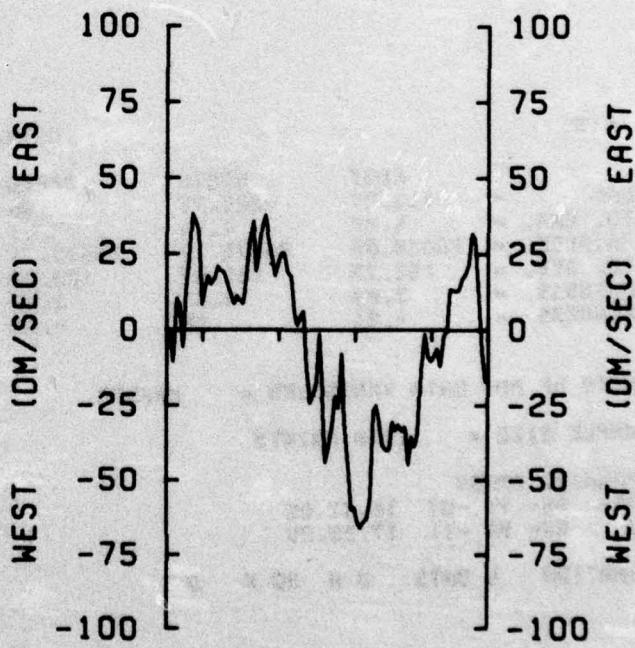
DURATION 4 DAYS 5 H 0 M 0 S







08
JUN
69



3011WE1H

Data number 3014

Instrument No.: M-198

Type: Magnetic tape current meter

Depth: 16 m

Water depth: 2680 m

Start time: 69-VI-07 165200

Stop time: 69-VI-11 172200

Duration: 4d 0h 30m

Sampling scheme: Continuous

one reading every 5 seconds

COMMENTS:

STATS

	EAST	NORTH
MEAN	-114.87	-224.75
STD. ERR.	4.22	4.74
VARIANCE	20889.85	26074.17
STD. DEV.	143.73	161.47
KURTOSIS	2.68	2.83
SKEWNESS	-.21	.28

DATA/ 3014C300

	EAST	&	NORTH	
SPEED	= NNNNN	EAST	&	NORTH
307.46	= COVARIANCE			= NNNNN
3.71	= STD. ERR. OF COVARIANCE			= -4820.85
15893.71	= STD. DEV. OF COVARIANCE			= 1180.48
126.23	= CORRELATION COEFFICIENT			= 40520.18
2.43	= VECTOR MEAN			= -.212
-.02	= VECTOR VARIANCE			= 262.45
	= STD. DEV.			= 29988.41
				= 182.88

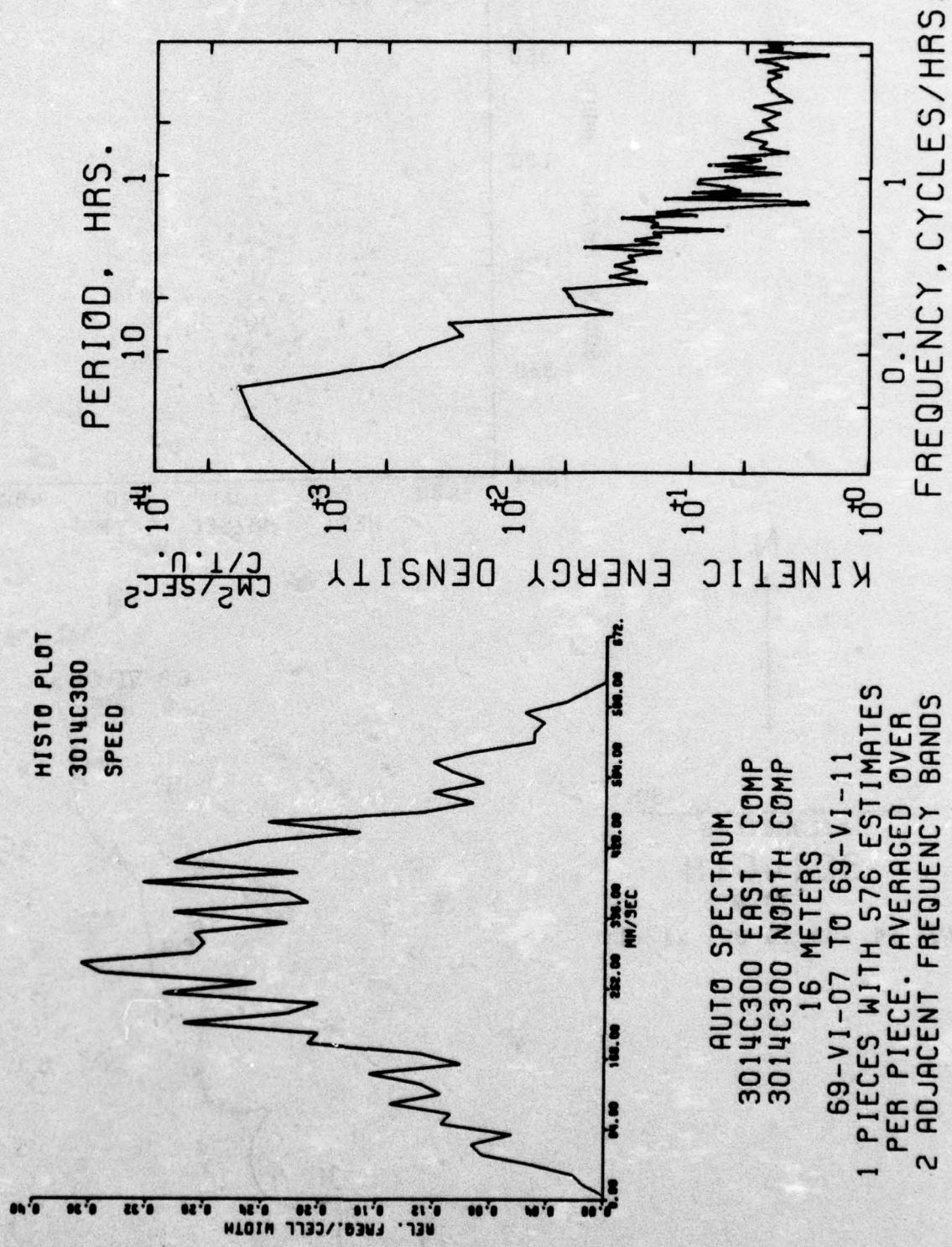
UNITS OF RAW DATA VARIABLES = MM/SEC

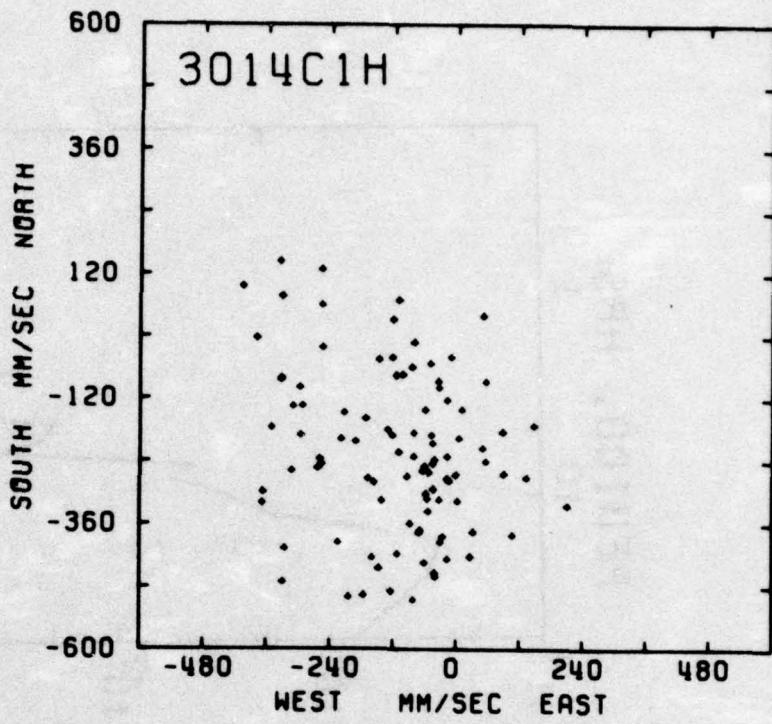
SAMPLE SIZE = 1158 POINTS

SPANNING RANGE

FROM 69-VI-07 16.52.00
TO 69-VI-11 17.22.00

DURATION 4 DAYS 0 H 30 M 0 S





N
↑

0. 30.
KILOMETERS

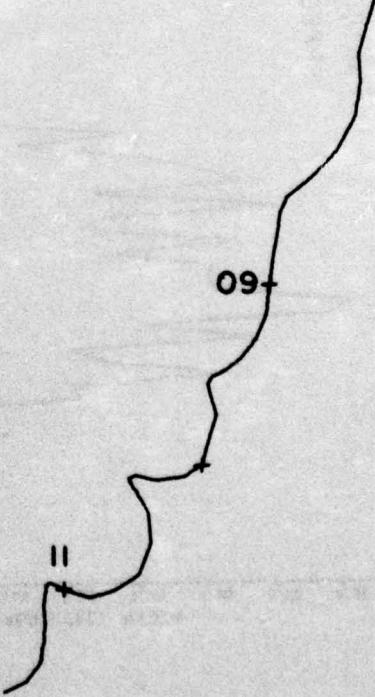
3014C1H

16 M

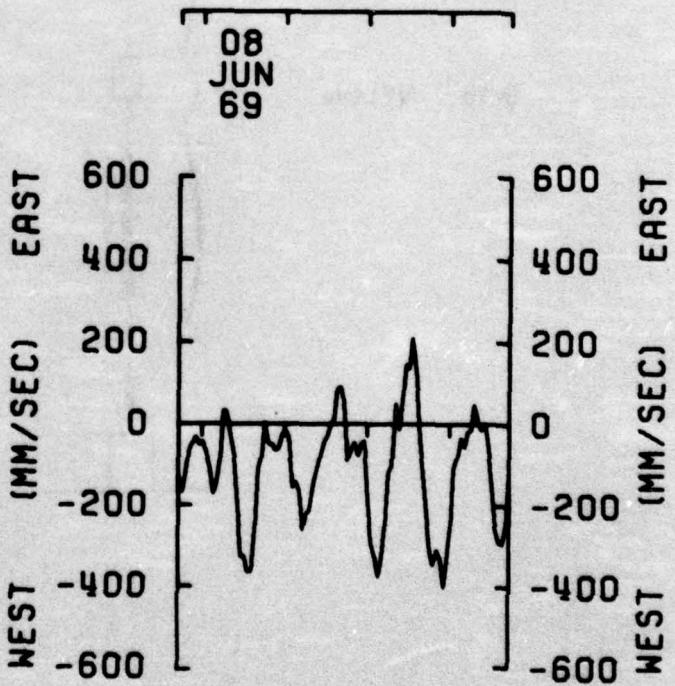
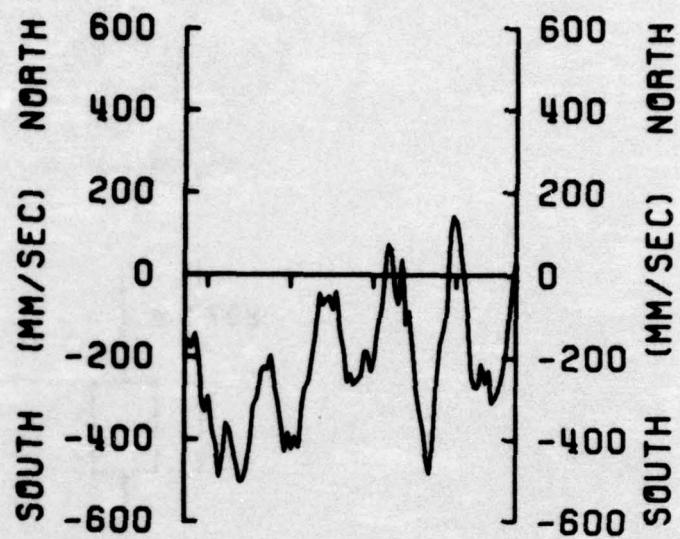
69- VI -08 TO 69- VI -11

69-VI-08*

09-

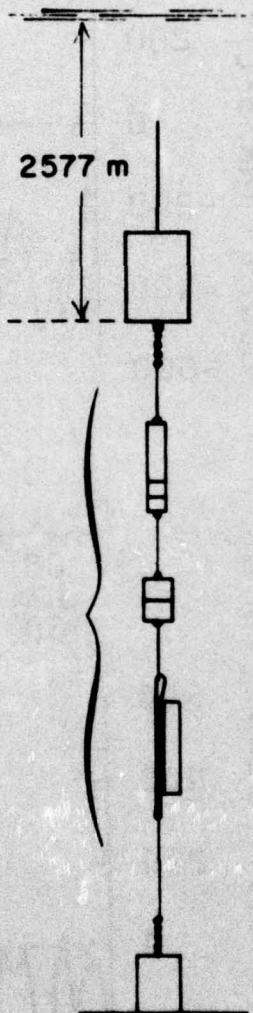


3014C1H
16 M



STATION 302

9/16" NYLON



SYNTACTIC FOAM FLOAT WITH RADIO,
LIGHT AND FLAG

1 m CHAIN

10 m

CURRENT METER - 3021

10 m

ACOUSTIC BEACON

10 m

ACOUSTIC BEACON, AMF

74 m

3 m CHAIN

800 LB. ANCHOR

Mooring No. 302

Set 69 June 07 39° 05.9N 69° 59.5W
Year Month Day Latitude Longitude

Set by J. Gifford Ship R. V. Chain Cruise 92

Retrieved 69 Oct 11
Year Month Day

Retrieved by J. Gifford Ship R. V. Atlantis II Cruise 53

Purpose of Mooring: Long term near-bottom mooring.

Mooring Type: Subsurface mooring with syntactic foam cylinder.

<u>Data Number</u>	<u>Instrument Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3021*	M-159	M.C.M.	2586	

Water depth 2685

Hydrographic Stations

R. V. Chain cruise 92 Station 896

R. V. Chain cruise 92 Station 898

COMMENTS ON MOORING:

Data number 3021

Instrument No.: M-159

Type: Magnetic tape current meter

Depth: 2586 m

Water depth: 2685 m

Start time: 69-VI-08 183305

Stop time: 69-X-11 170305

Duration: 124d 22h 30m

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 16

interval time = 1800 seconds

COMMENTS:

STATS

	EST	NORTH
MEAN	-22.39	-3.41
STD. ERR.	.55	.79
VARIANCE	1700.95	3767.23
STD. DEV.	42.43	61.39
KURTOSIS	3.21	3.80
SKEWNESS	.18	-.08

DATA/ 3021J1800

SPEED	= MEAN	EAST & NORTH	= MEAN
56.08	= COVARIANCE	-706.29	
.53	= STD. ERR. OF COVARIANCE	45.51	
1712.12	= STD. DEV. OF COVARIANCE	3628.62	
41.38	= CORRELATION COEFFICIENT	-.204	
6.45	= VECTOR MEAN	22.63	
1.06	= VECTOR VARIANCE	2789.58	
	= STD. DEV.	52.76	

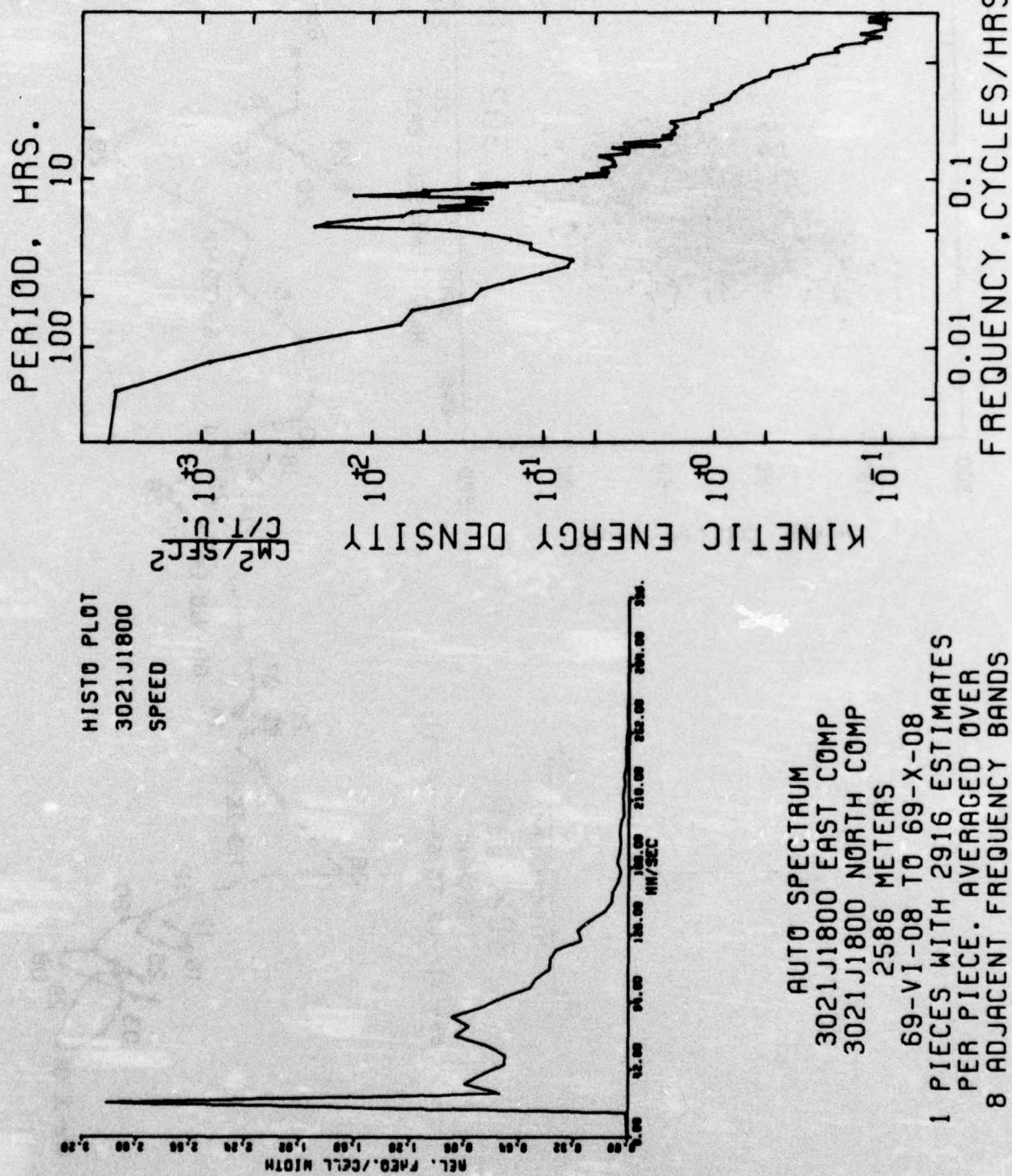
UNITS OF RAW DATA VARIABLES = MM/SEC

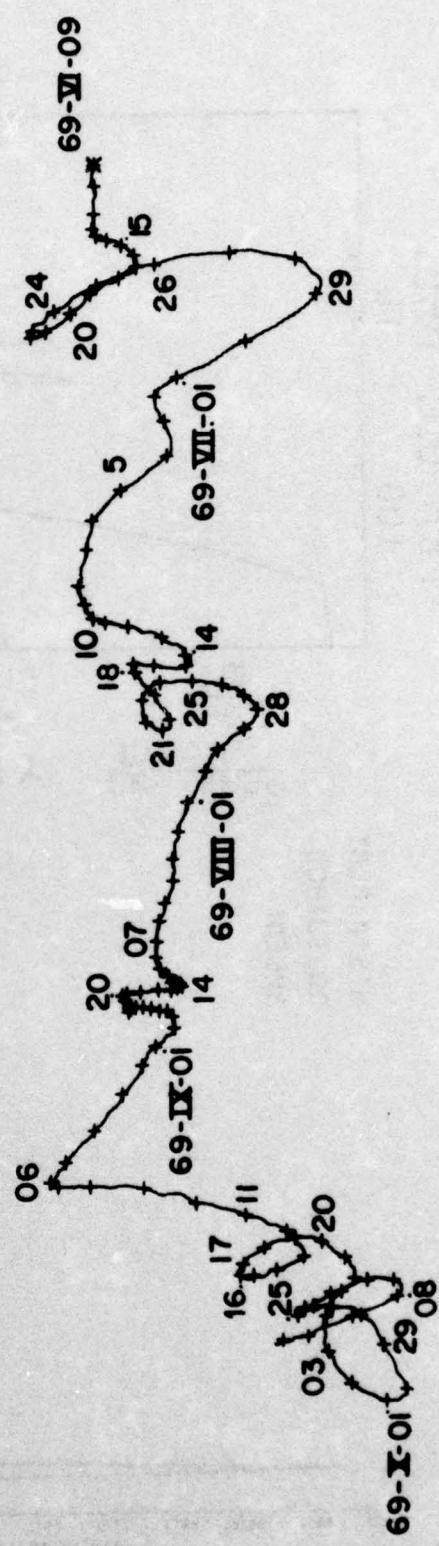
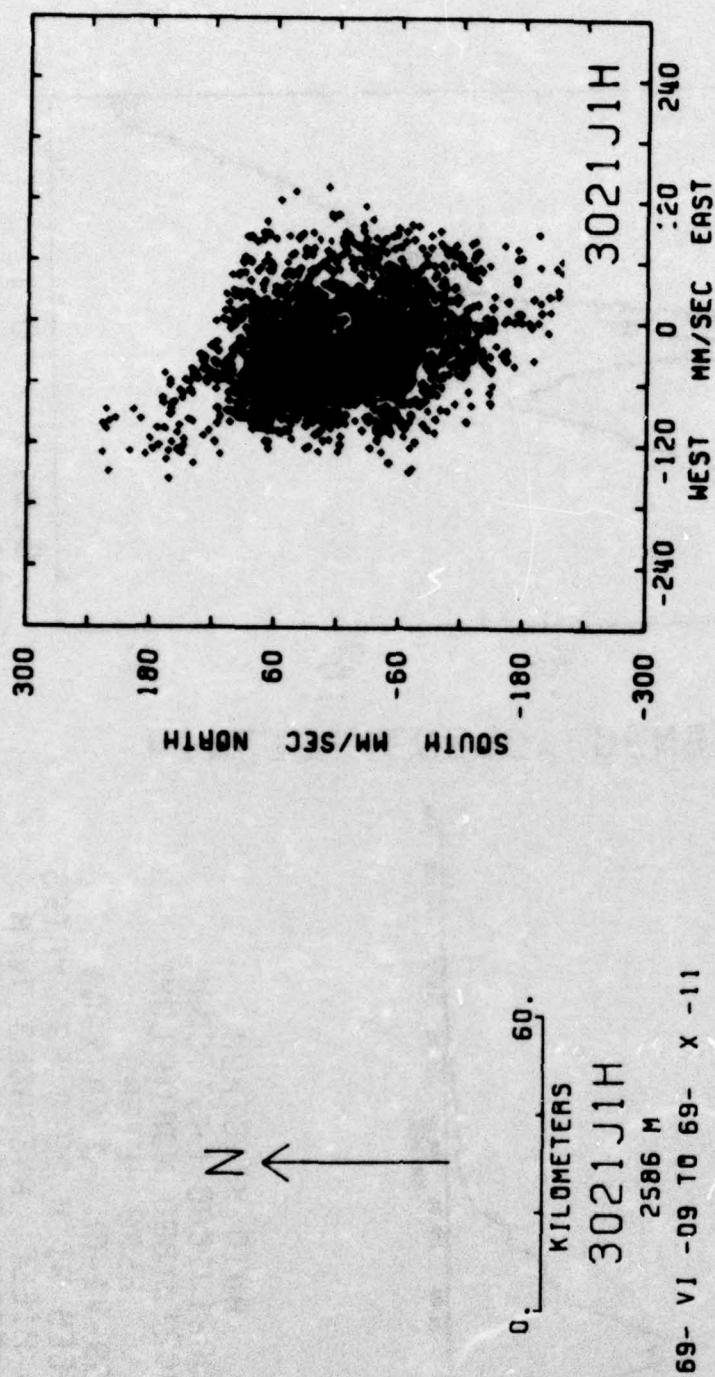
SAMPLE SIZE = 5000 POINTS

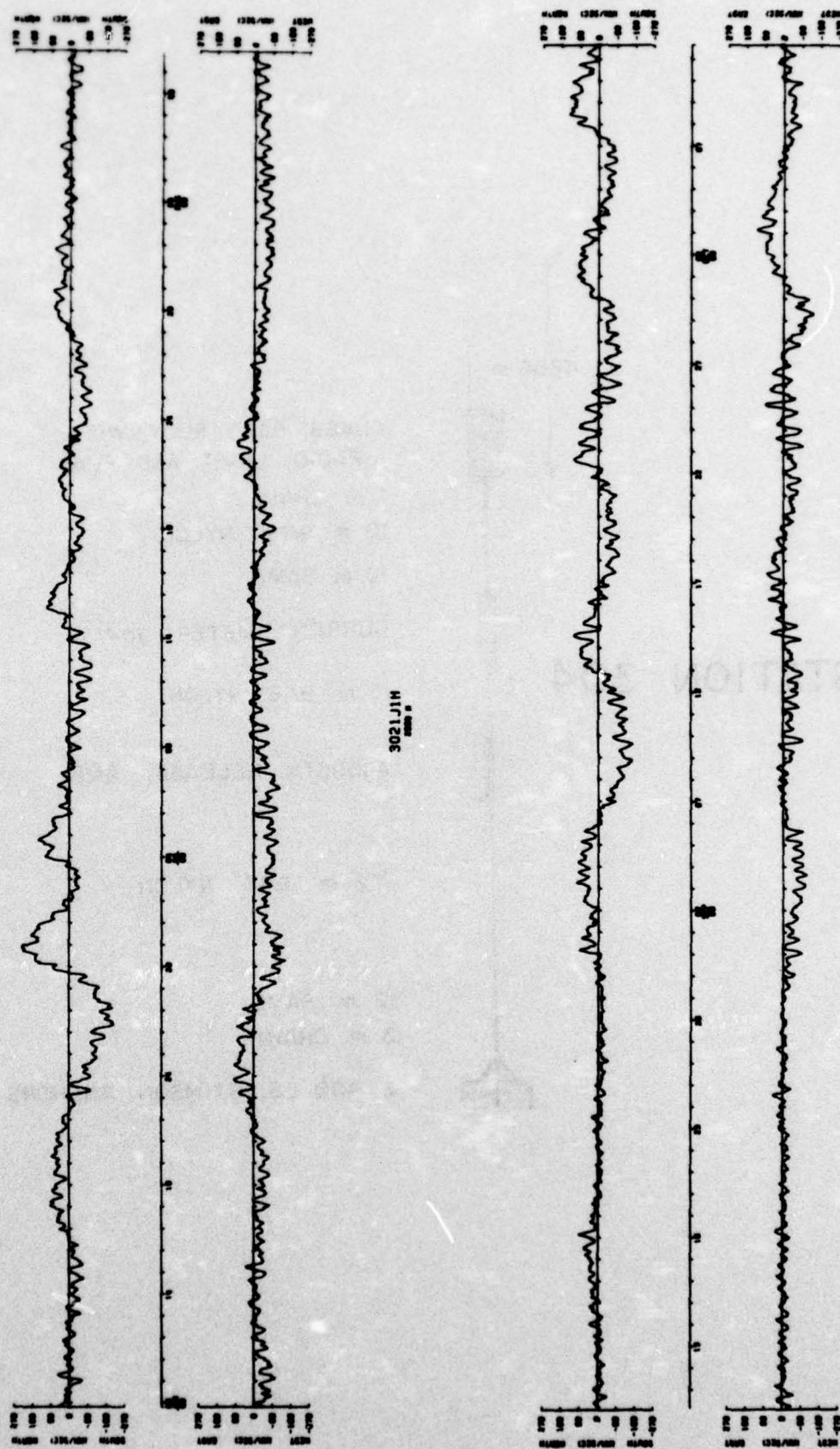
SPANNING RANGE

FROM 69-VI-08 18.33.05
TO 69-X-11 17.03.06

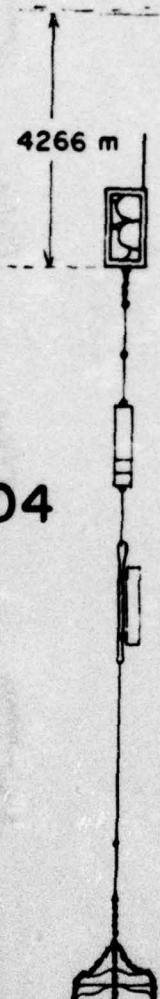
DURATION 124 DAYS 22 H 30 M 0 S







STATION 304



GLASS BALL BUOY WITH
RADIO, LIGHT AND FLAG

1 m CHAIN

10 m 9/16" NYLON

10 m SAME

CURRENT METER - 3041

10 m 9/16" NYLON

ACOUSTIC RELEASE, AMF

172 m 9/16" NYLON

12 m SAME

3 m CHAIN

2 400 LB. STIMSON ANCHORS

Mooring No. 304

Set 69 June 12 36° 23.4N 70° 00.2W
Year Month Day Latitude Longitude

Set by J. Gifford Ship R. V. Chain Cruise 92

Retrieved 69 Aug 14
Year Month Day

Retrieved by R. Heinmiller Ship R. V. Chain Cruise 95

Purpose of Mooring: To study current structure under the Gulf Stream.

Mooring Type: Subsurface mooring with glass ball float.

<u>Data Number</u>	<u>Instrument Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3041*	M-122	M.C.M.	4287	

Water depth 4486

COMMENTS ON MOORING:

Data number 3041

Instrument No.: M-122

Type: Magnetic tape current meter

Depth: 4287 m

Water depth: 4486 m

Start time: 69-VI-12 204825

Stop time: 69-VIII-14 034825

Duration: 62d 7h

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 16

interval time = 1800 seconds

COMMENTS:

STATS

	EAST	NORTH
MEAN	44.03	88.42
STD. ERR.	1.60	3.96
VARIANCE	7888.45	46890.23
STD. DEV.	87.87	218.63
KURTOSIS	8.22	2.21
SKWNESS	-1.45	-.78

DATA/ 3041J1800

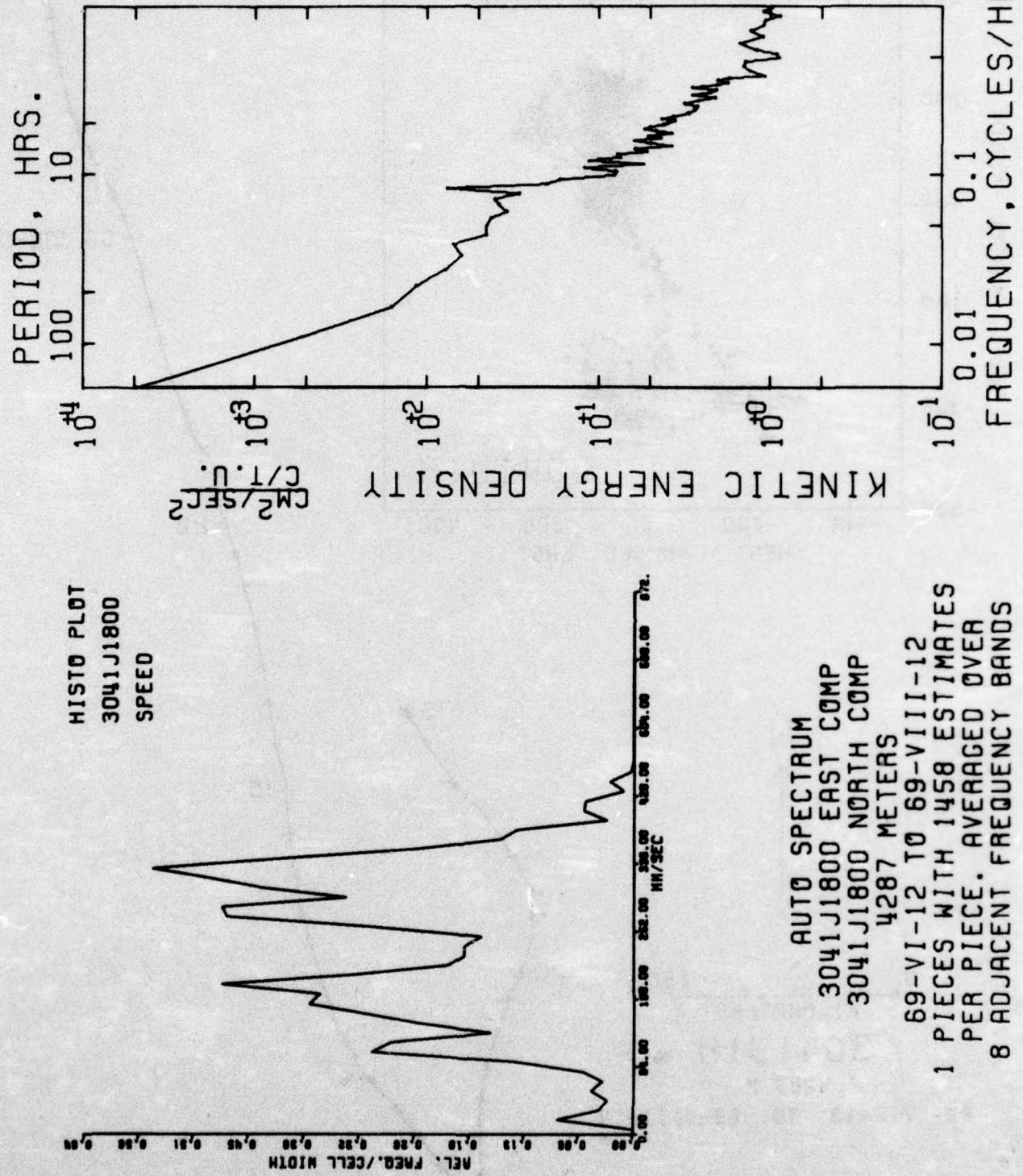
SPEED	#	MEAN	EAST & NORTH	MEAN
237.36	#	COVARIANCE		11115.88
1.66	#	STD. ERR. OF COVARIANCE		370.76
8214.13	#	STD. DEV. OF COVARIANCE		20276.85
.80.63	#	CORRELATION COEFFICIENT		.505
2.17	#	VECTOR MEAN		88.67
-.25	#	VECTOR VARIANCE		27908.34
	#	STD. DEV.		165.25

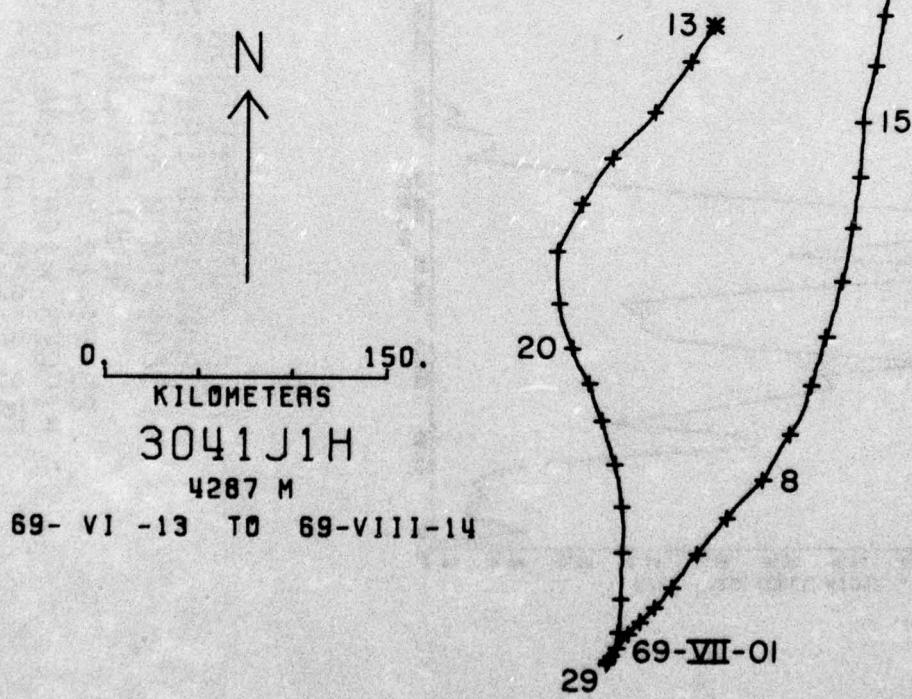
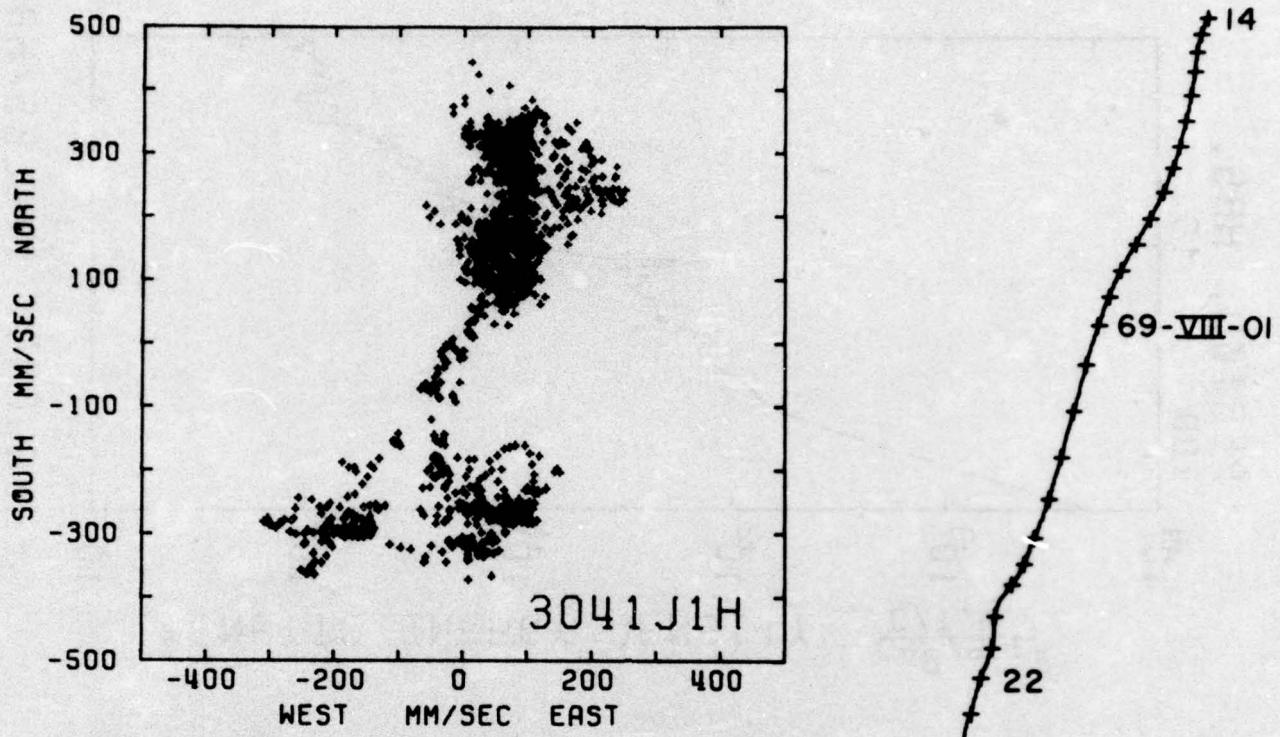
UNITS OF RAW DATA VARIABLES = MM/SEC

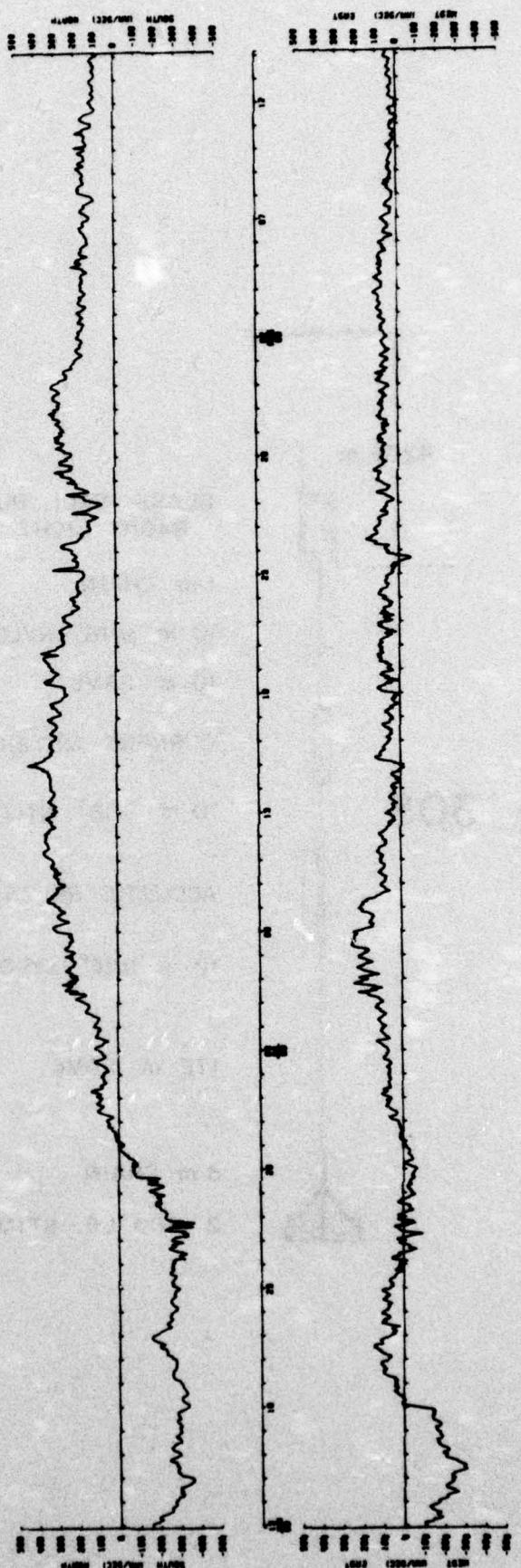
SAMPLE SIZE = 2881 POINTS

SPANNING RANGE
FROM 69-VI-12 204825
TO 69-VIII-14 034825

DURATION 62 DAYS 7 H 0 M 0 S

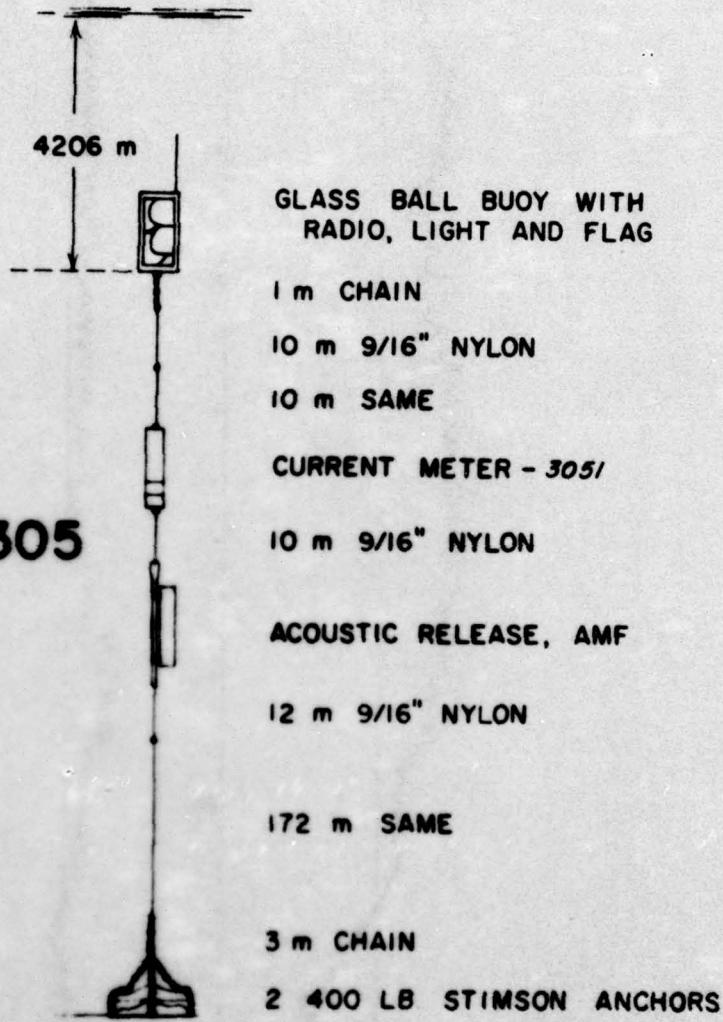






MILANO

STATION 305



Mooring No. 305

Set 69 June 12 36° 43.0N 70° 00.3W
Year Month Day Latitude Longitude

Set by J. Gifford Ship R. V. Chain Cruise 92

Retrieved 69 Aug 14
Year Month Day

Retrieved by R. Heinmiller Ship R. V. Chain Cruise 95

Purpose of Mooring: To study current structure under the Gulf Stream.

Mooring Type: Subsurface mooring with glass ball float.

<u>Data Number</u>	<u>Instrument Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3051*	M-127	M.C.M.	4227	

Water depth 4426

COMMENTS ON MOORING:

Data number 3051

Instrument No.: M-127

Type: Magnetic tape current meter

Depth: 4227 m

Water depth: 4426 m

Start time: 69-VI-12 183355

Stop time: 69-VIII-14 093355

Duration: 62d 15h

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 16

interval time = 1800 seconds

COMMENTS:

STATS

	EAST	NORTH
MEAN	22.86	103.80
STD. ERR.	1.74	3.87
VARIANCE	8078.88	45007.72
STD. DEV.	85.27	212.36
KURTOSIS	8.08	2.81
SKENNESS	-1.59	-0.85

DATA/ 305101800

SPEED	=	NNNN	EAST & NORTH	=	NNNN
233.56	=	COVARIANCE		=	10208.47
1.81	=	STD. ERR. OF COVARIANCE		=	344.36
10847.58	=	STD. DEV. OF COVARIANCE		=	10084.46
104.83	=	CORRELATION COEFFICIENT		=	.504
2.14	=	VECTOR MEAN		=	108.41
.18	=	VECTOR VARIANCE		=	27087.30
	=	STD. DEV.		=	164.58

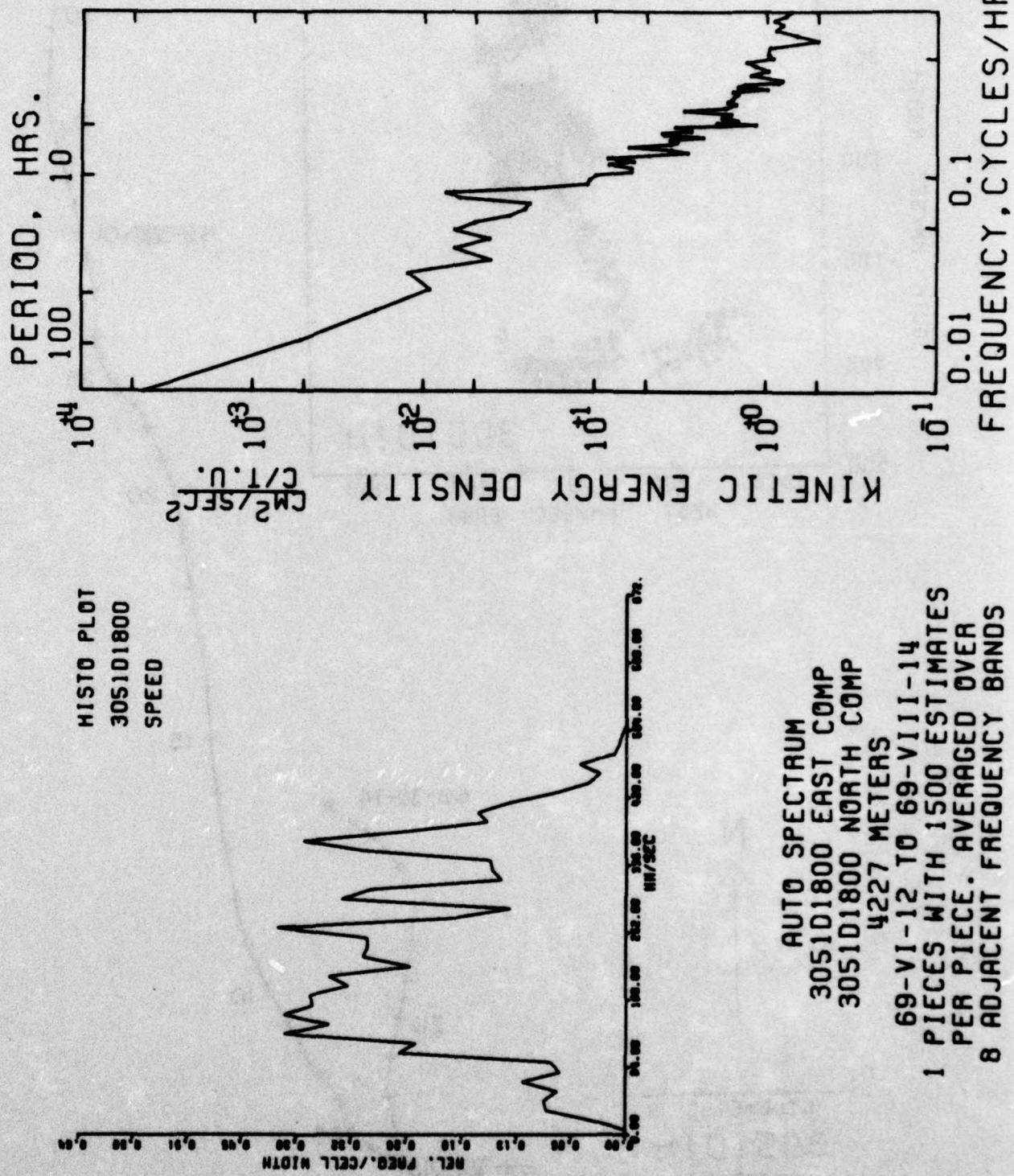
UNITS OF RAW DATA VARIABLES = MM/SEC

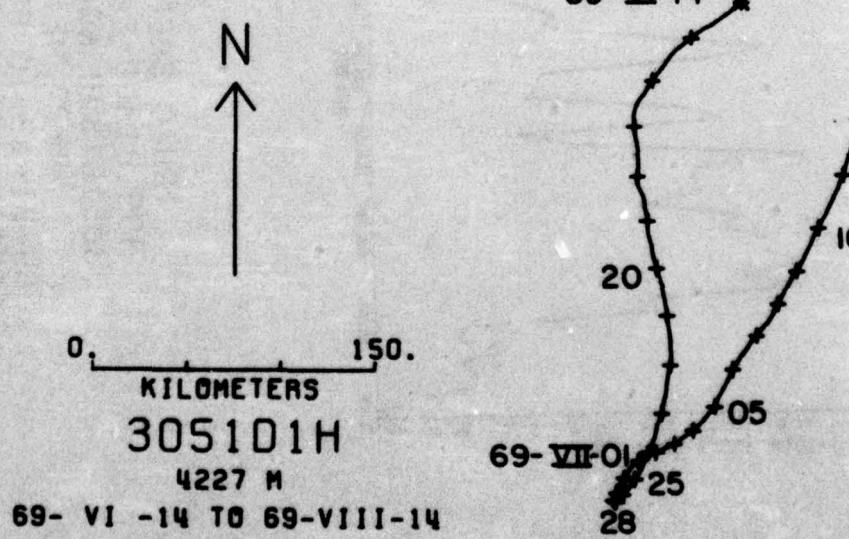
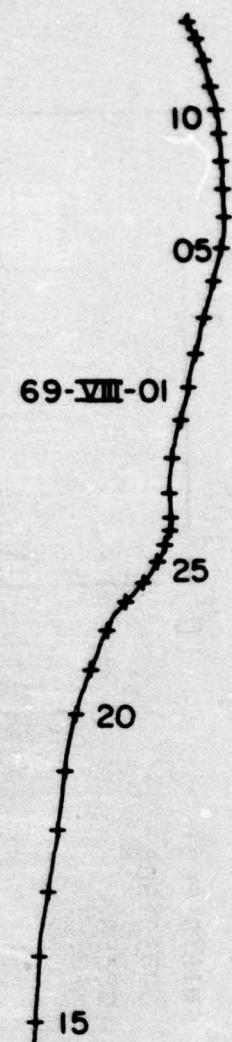
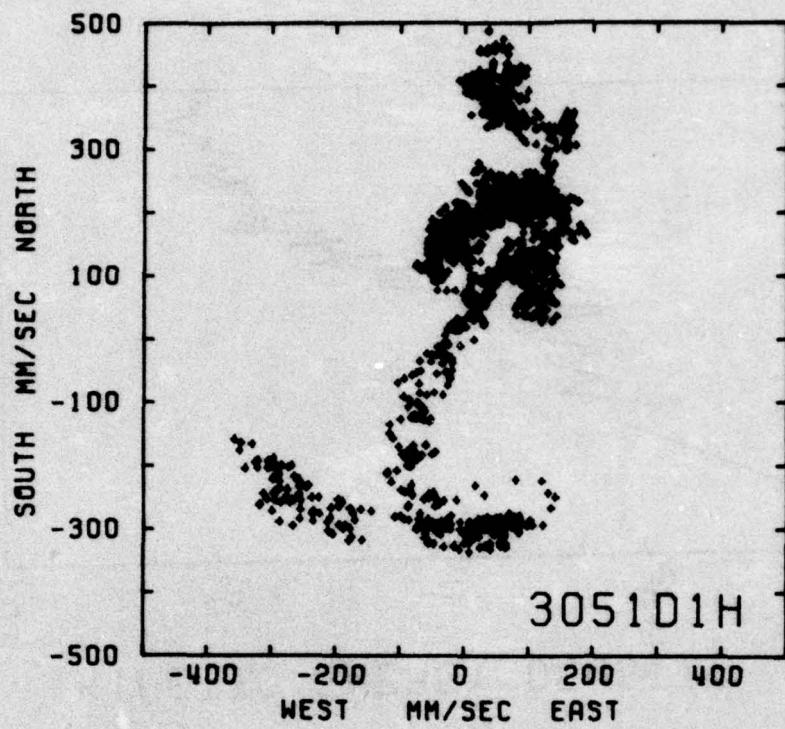
SAMPLE SIZE = 3007 POINTS

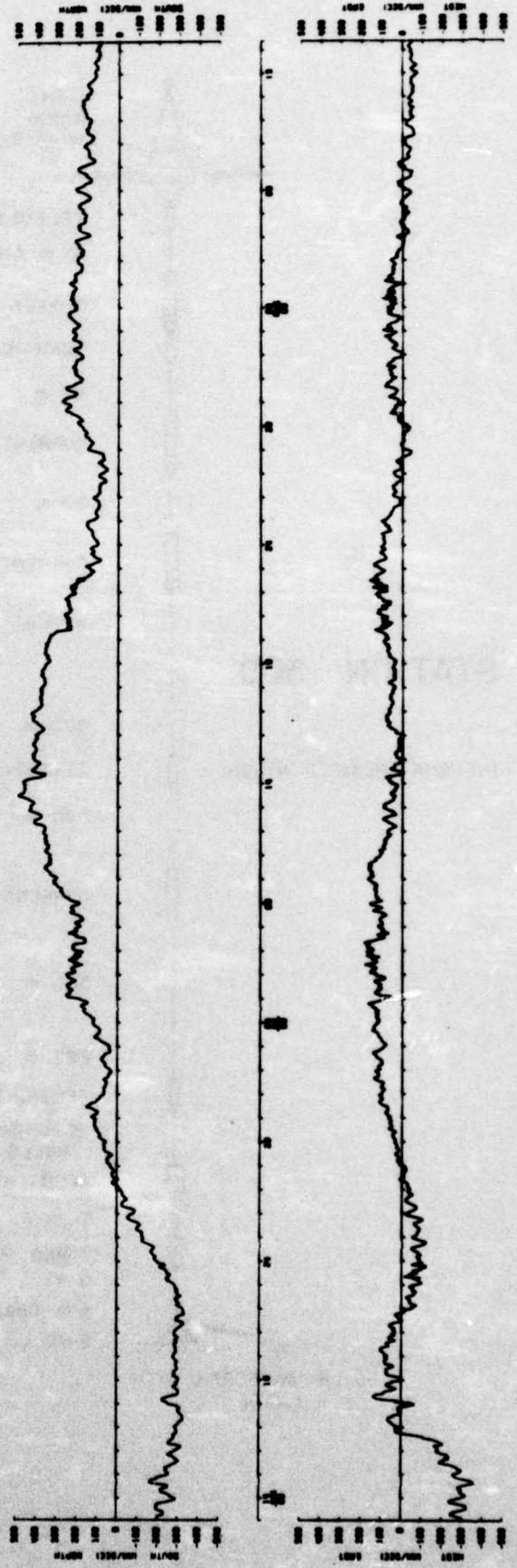
SPANNING RANGE

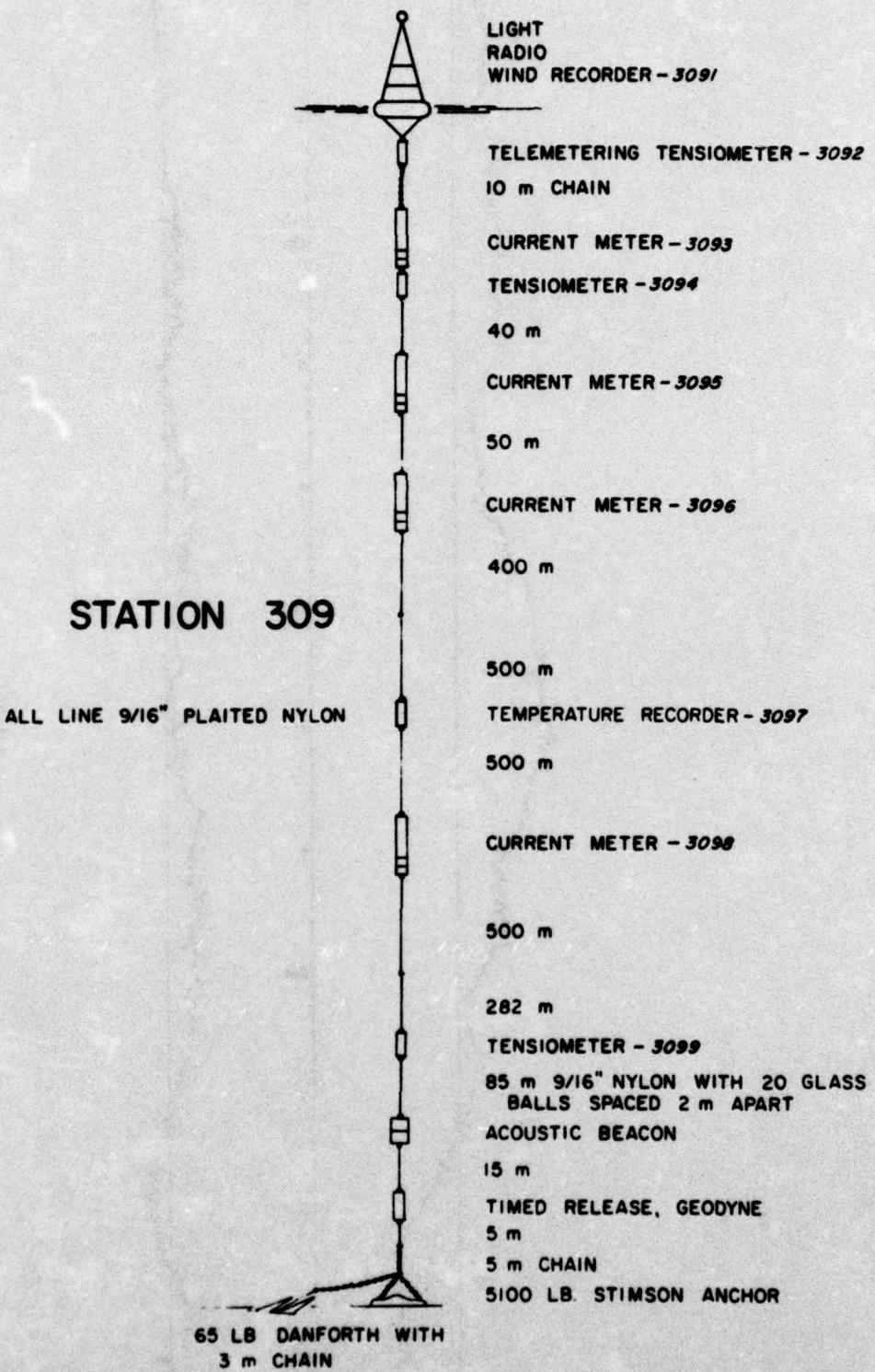
FROM 69-VI-12 18.33.55
TO 69-VIII-14 09.33.55

DURATION 62 DAYS 15 H 0 M 0 S









Mooring No. 309

Set 69 June 13 39° 09.0N 70° 00.2W
Year Month Day Latitude Longitude

Set by J. Gifford Ship R. V. Chain Cruise 92

Retrieved 69 Aug 11
Year Month Day

Retrieved by R. Heinmiller Ship R. V. Chain Cruise 95

Purpose of Mooring: Long term current measurements at Site D.

Mooring Type: All nylon surface mooring.

Data Number	Instrument Number	Type	Depth Meters	Comments
3091*	W-101X	M.W.R.	0	
3092	2001	Tel. Tens.	2	
3093*	M-203	M.C.M.	13	
3094	1023	Tens.	14	
3095*	M-214	M.C.M.	56	
3096*	M-213	M.C.M.	108	
3097	T-452	Temp.	1000	Lost
3098	M-211	M.C.M.	1692	Lost
3099	1024	Tens.	2565	Lost

Water depth 2678

Hydrographic Station

R. V. Chain cruise 92 Station 896

R. V. Chain cruise 92 Station 903

R. V. Chain cruise 95 Station 922

COMMENTS ON MOORING:

Surface toroid seen on July 6, 1969 by U.S.S. WALDO COUNTY. The mooring was hauled on August 11 because of hurricane threat. During recovery the line parted around 500 meters down the mooring. The release timer should have fired on August 12 1200. On August 29 the beacon was indicating it was still on station.

Data number 3091

Instrument No.: W-101X

Type: Magnetic tape wind recorder

Depth: -0-

Water depth: 2678 m

Start time: 69-VI-13 203640

Stop time: 69-VIII-11 210640

Duration: 59d 0h 30m

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 1800 seconds

COMMENTS:

Wind direction follows ocean current conventions to facilitate comparisons; add 180° to direction for meteorological reading.

STATS

DATA/ 3091WM800

MERN	-	EAST	8.88	NORTH	11.78
STD. ERR.	-		.43		.51
VARIANCE	-		1048.26		1487.19
STD. DEV.	-		32.38		38.58
KURTOSIS	-		2.69		1.87
SKEWNESS	-		-.30		-.91

SPEED	=	NNNN	EAST & NORTH	=	NNNN
		49.50	= COVARIANCE		417.81
		.23	= STD. ERR. OF COVARIANCE		15.27
		305.07	= STD. DEV. OF COVARIANCE		1149.57
		17.47	= CORRELATION COEFFICIENT		.335
		3.31	= VECTOR MEAN		14.82
		.25	= VECTOR VARIANCE		1287.79
			= STD. DEV.		35.61

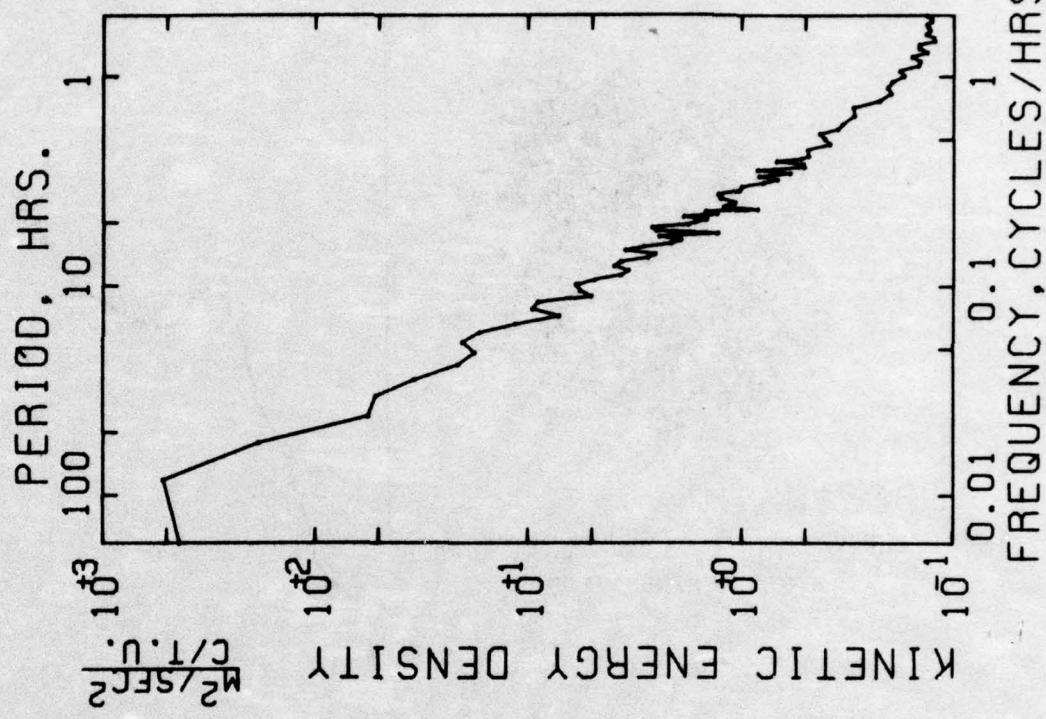
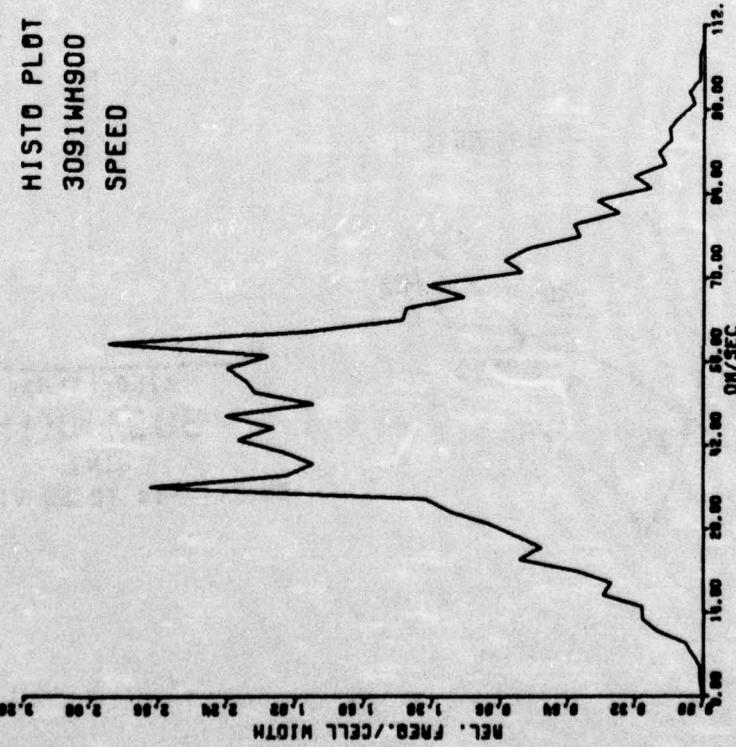
UNITS OF RAW DATA VARIABLES = DM/SEC

SAMPLE SIZE = 5867 POINTS

SPANNING RANGE

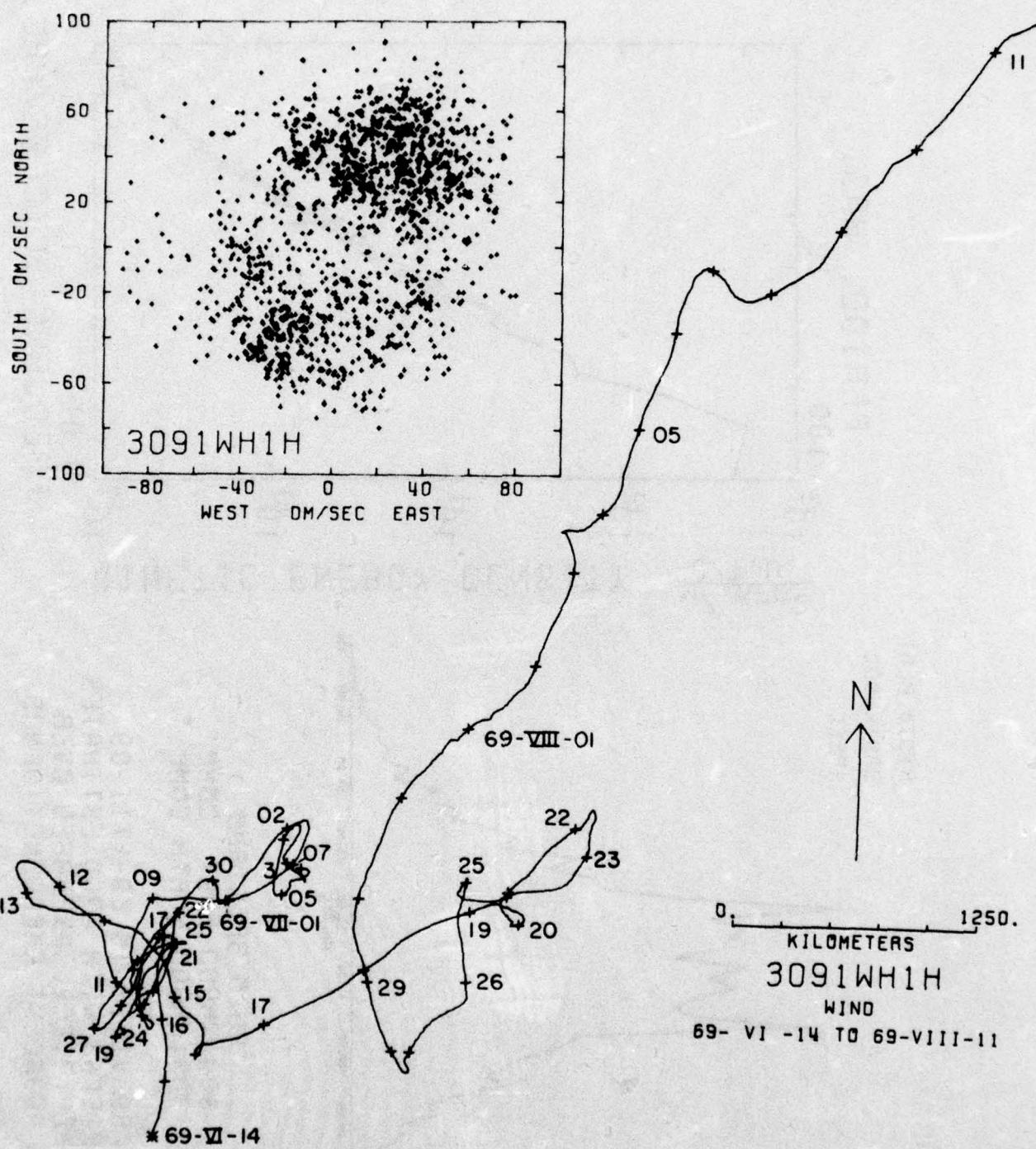
FROM 69-VI-13 20.38.40
TO 69-VIII-11 21.08.40

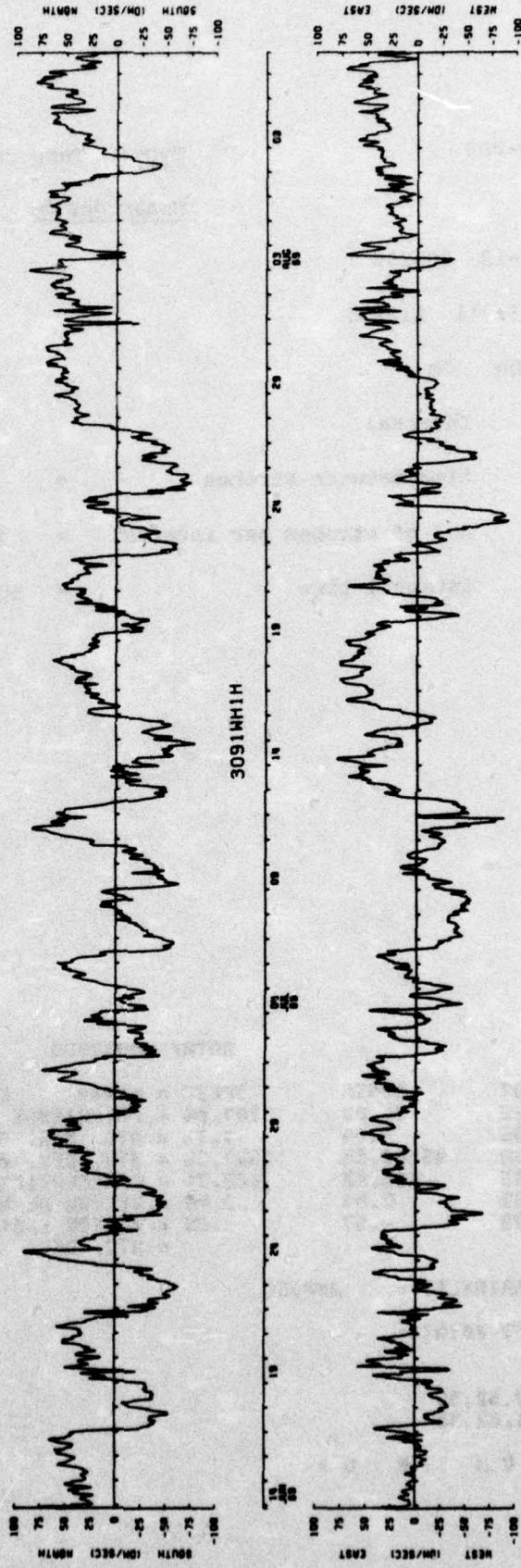
DURATION 59 DAYS 0 H 30 M 0 S



AUTO SPECTRUM
3091WH900 EAST COMP
3091WH900 NORTH COMP

69-VI-13 TO 69-VIII-09
1 PIECES WITH 2700 ESTIMATES
PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS





Data number 3093

Instrument No.: M-203

Type: Tape recording current meter

Depth: 13 m

Water depth: 2678 m

Start time: 69-VI-13 205235

Stop time: 69-VIII-11 212235

Duration: 59d 0h 30m

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

STATS

	EAST	NORTH
MEAN	.55	88.80
STD. ERR.	3.02	2.84
VARIANCE	51680.00	45560.88
STD. DEV.	227.35	213.45
KURTOSIS	2.62	2.87
SKENNESS	-.02	-.57

DATA/ 30930800

SPEED =	MEAN	EAST & NORTH	MEAN
287.64 = COVARIANCE			-3888.04
1.71 = STD. ERR. OF COVARIANCE			609.23
18587.00 = STD. DEV. OF COVARIANCE			45862.85
128.71 = CORRELATION COEFFICIENT			-.080
2.48 = VECTOR MEAN			88.80
.05 = VECTOR VARIANCE			48825.94
= STD. DEV.			220.51

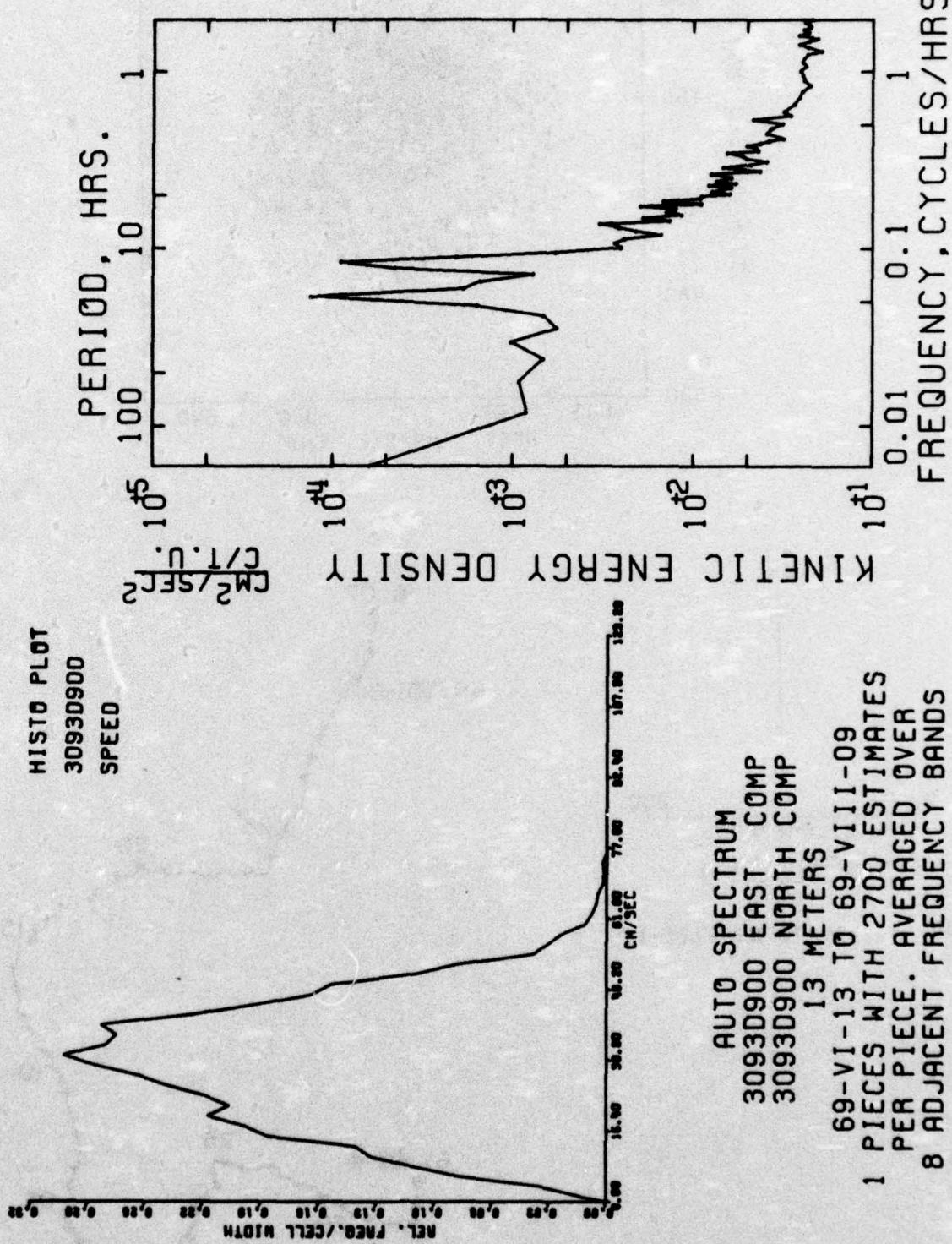
UNITS OF RAW DATA VARIABLES = MM/SEC

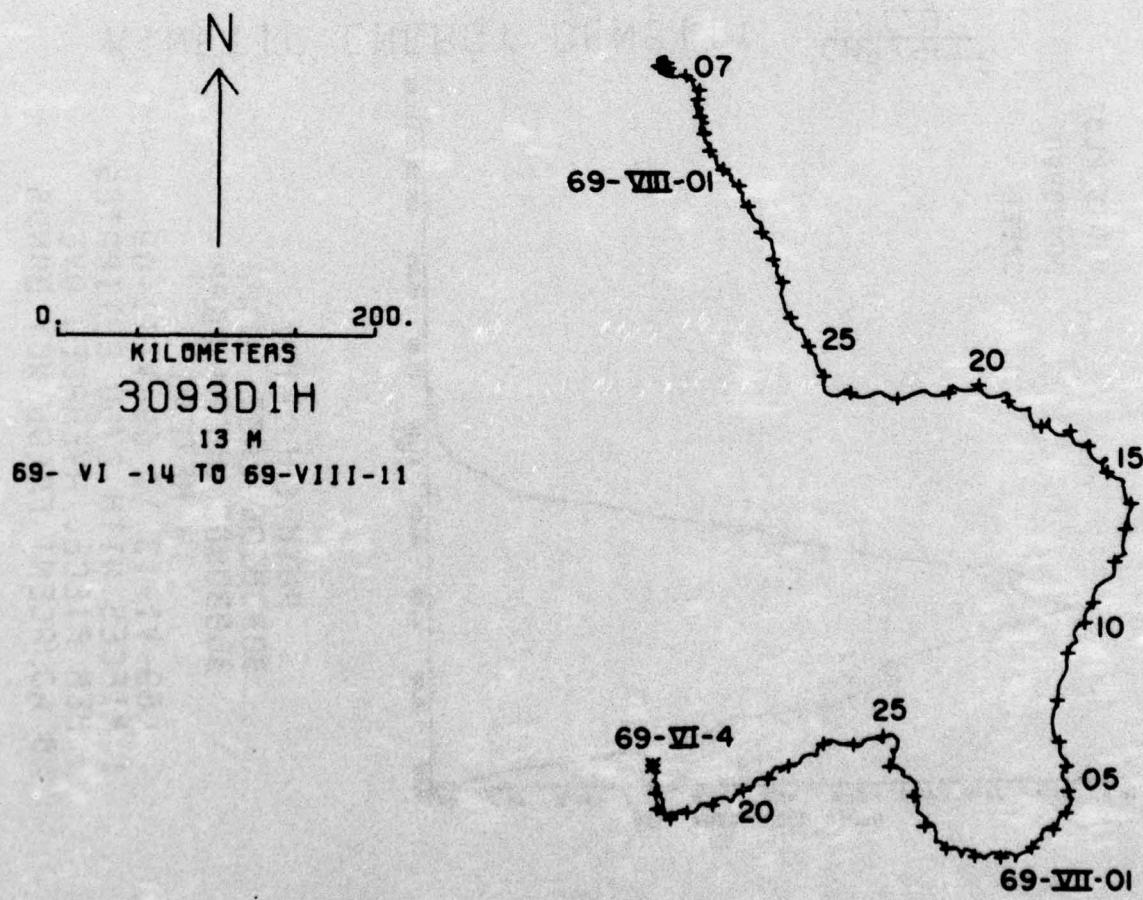
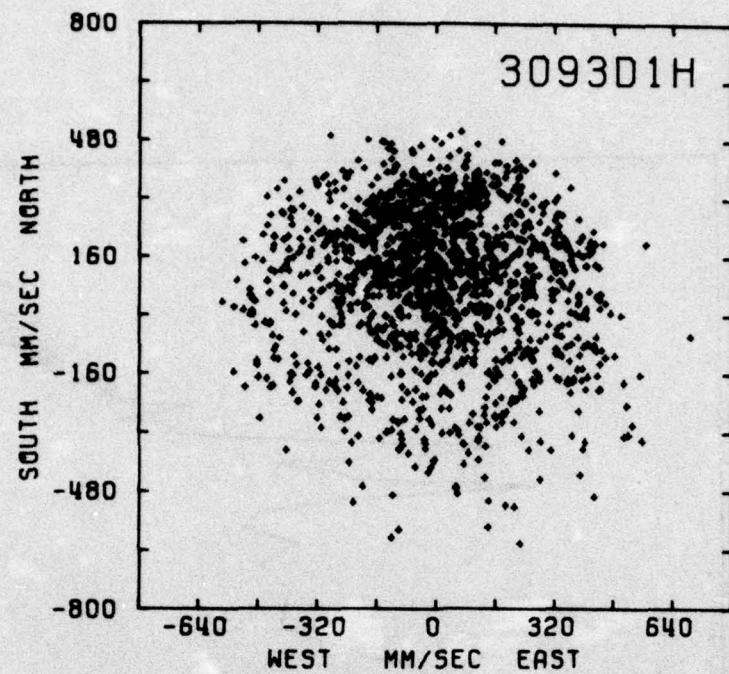
SAMPLE SIZE = 5667 POINTS

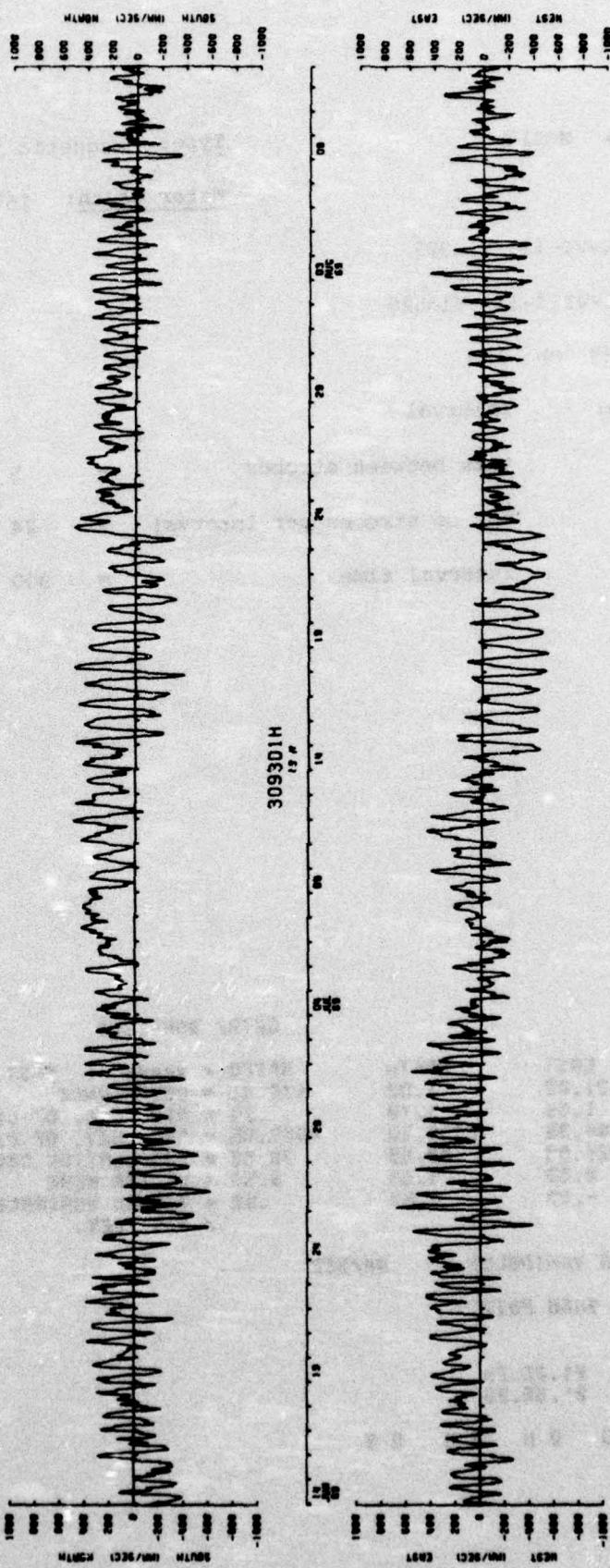
SPANNING RANGE

FROM 69-VI-13 20.52.35
TO 69-VIII-11 21.22.35

DURATION 59 DAYS 0 H 30 M 0 S







Data number 3095

Instrument No.: M-214

Type: Magnetic tape current meter

Depth: 56 m

Water depth: 2678 m

Start time: 69-VI-13 212025

Stop time: 69-VIII-11 213525

Duration: 59d 0h 15m

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

STATS

MERN	-21.02	EAST	NORTH
STD. ERR.	1.68	1.02	1.18
VARIANCE	10000.36	8000.10	4000.10
STD. DEV.	128.83	89.48	63.25
KURTOSIS	2.52	3.03	3.30
SKEWNESS	-.09	-.44	.55

DATA/ 3095E800

SPEED = 80000	EAST & NORTH	= 80000
138.81 = COVARIANCE	= -3424.17	
.84 = STD. ERR. OF COVARIANCE	= 145.68	
4897.85 = STD. DEV. OF COVARIANCE	= 10865.84	
70.63 = CORRELATION COEFFICIENT	= -.302	
3.30 = VECTOR MEAN	= 21.05	
.55 = VECTOR VARIANCE	= 12048.23	
.84 = STD. DEV.	= 109.76	

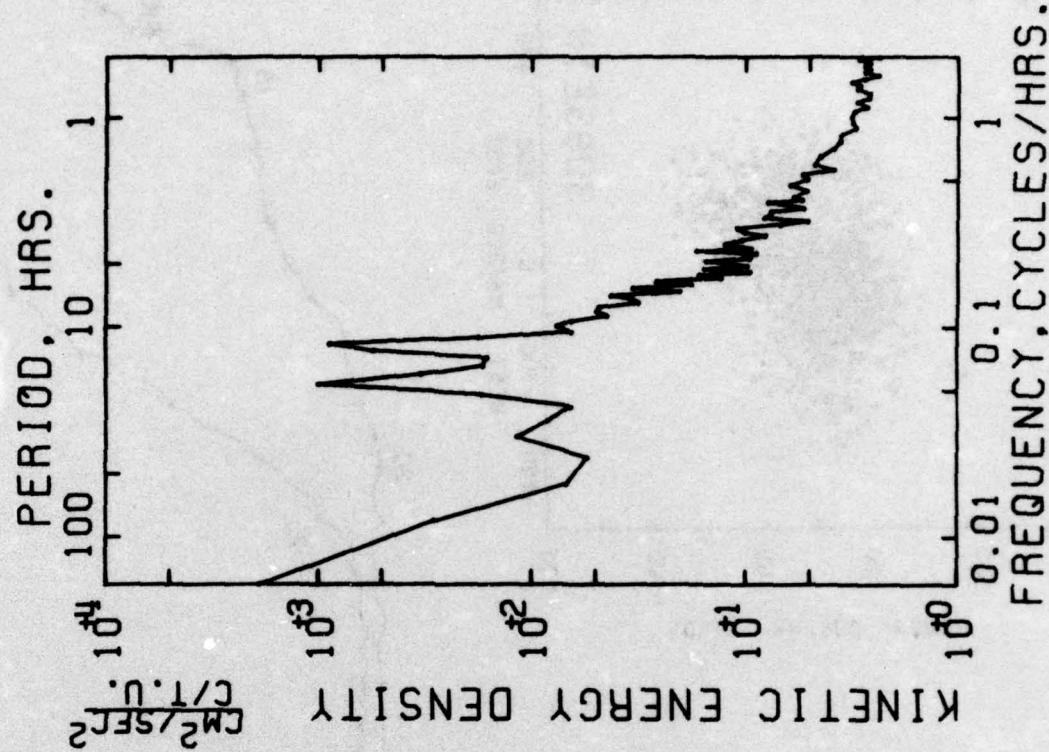
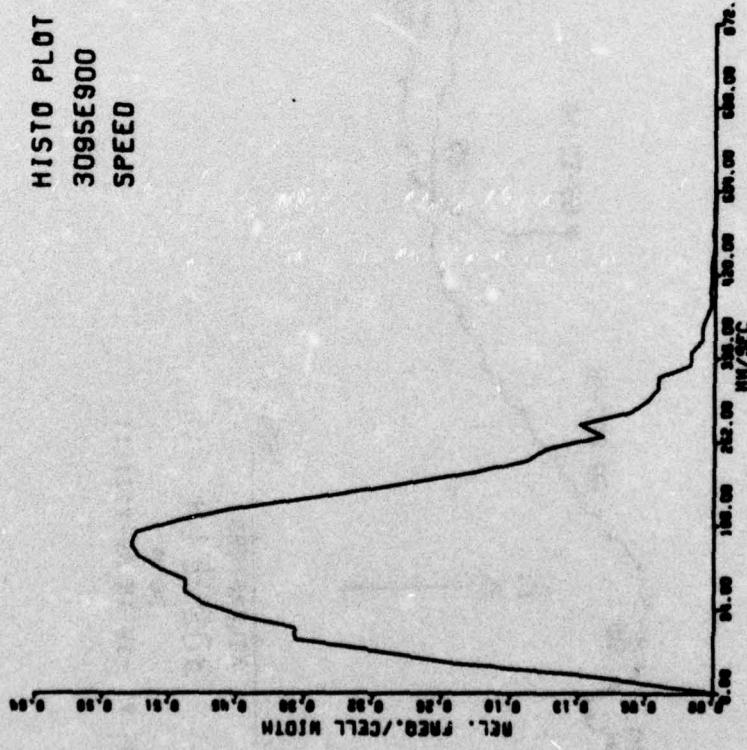
UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 5666 POINTS

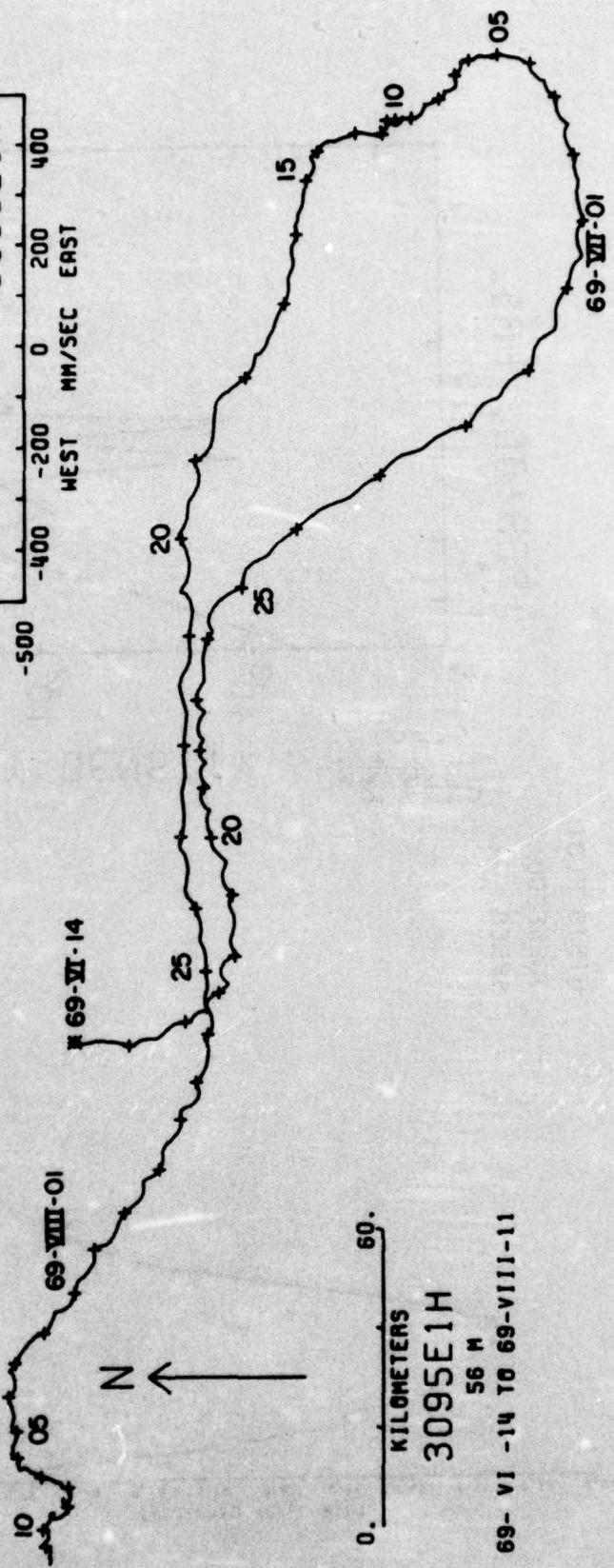
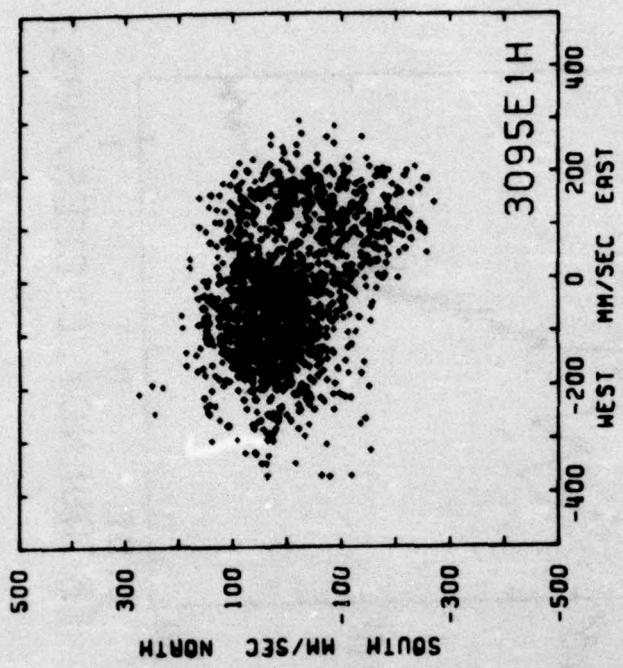
SPANNING RANGE

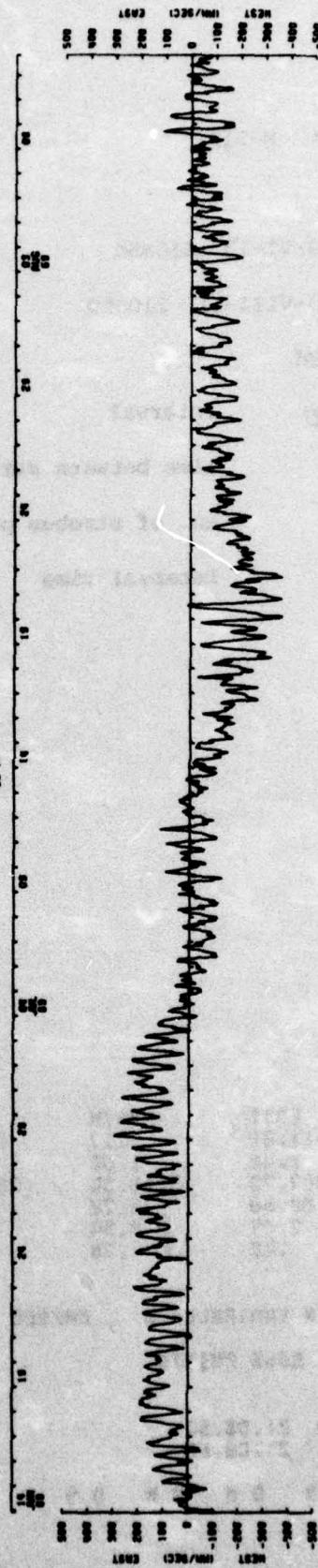
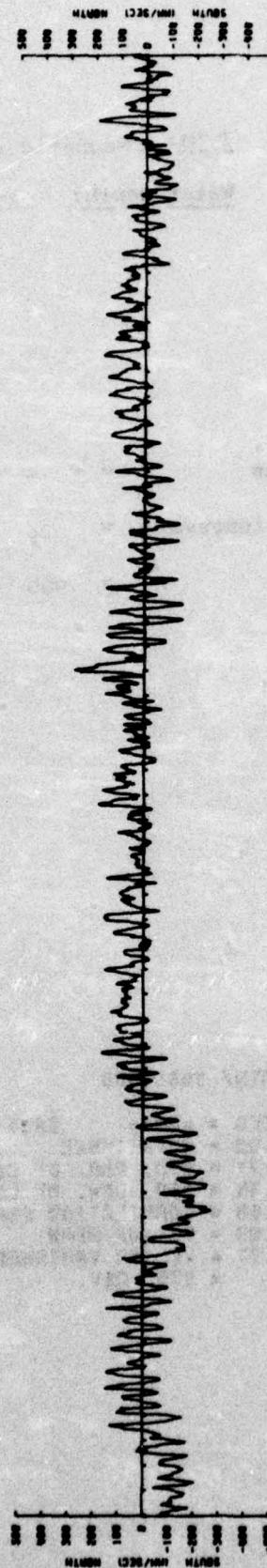
FROM 69-VI-13 212025
TO 69-VIII-11 213525

DURATION 59 DAYS 0H 15M 0S



AUTO SPECTRUM
3095E900 EAST COMP
3095E900 NORTH COMP
56 METERS
69-VI-13 TO 69-VIII-09
1 PIECES WITH 2700 ESTIMATES
PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS





Data number 3096

Instrument No.: M-213

Type: Magnetic tape current meter

Depth: 108 m

Water depth: 2678 m

Start time: 69-VI-13 210850

Stop time: 69-VIII-11 210850

Duration: 59d

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

STATS

MEAN	EAST	NORTH
-11.21	-17	
STD. ERR.	1.48	1.02
VARIANCE	12007.73	5005.94
STD. DEV.	109.58	76.72
KURTOSIS	2.04	3.94
SKEWNESS	.42	-.78

DATR/ 3096C900

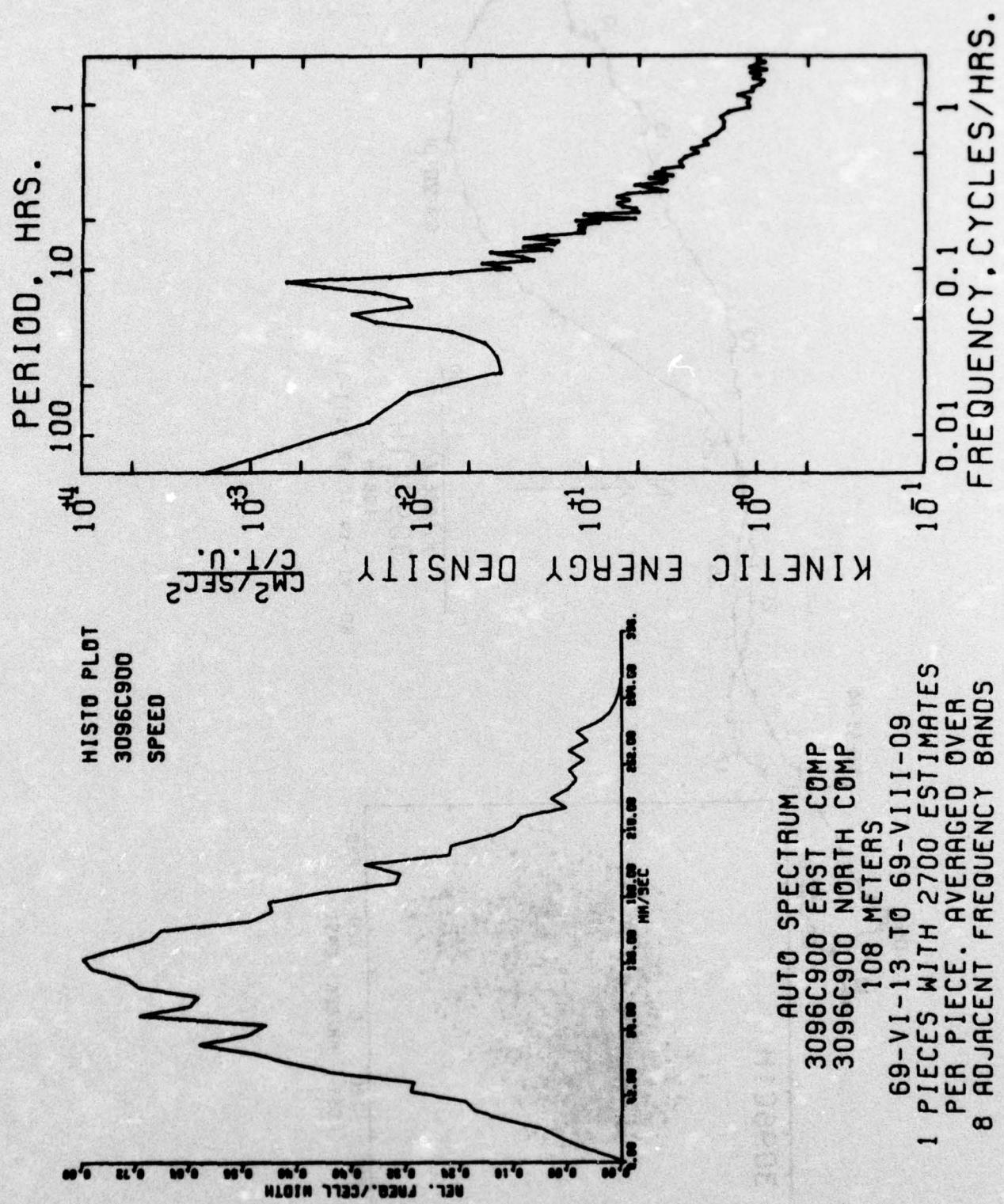
SPEED	= MEAN	EAST & NORTH	= MEAN
123.03	= COVARIANCE	-3058.57	
.71	= STD. ERR. OF COVARIANCE	107.01	
2.002.44	= STD. DEV. OF COVARIANCE	8054.28	
53.00	= CORRELATION COEFFICIENT	-.984	
2.03	= VECTOR MEAN	11.21	
.37	= VECTOR VARIANCE	8948.53	
	= STD. DEV.	94.58	

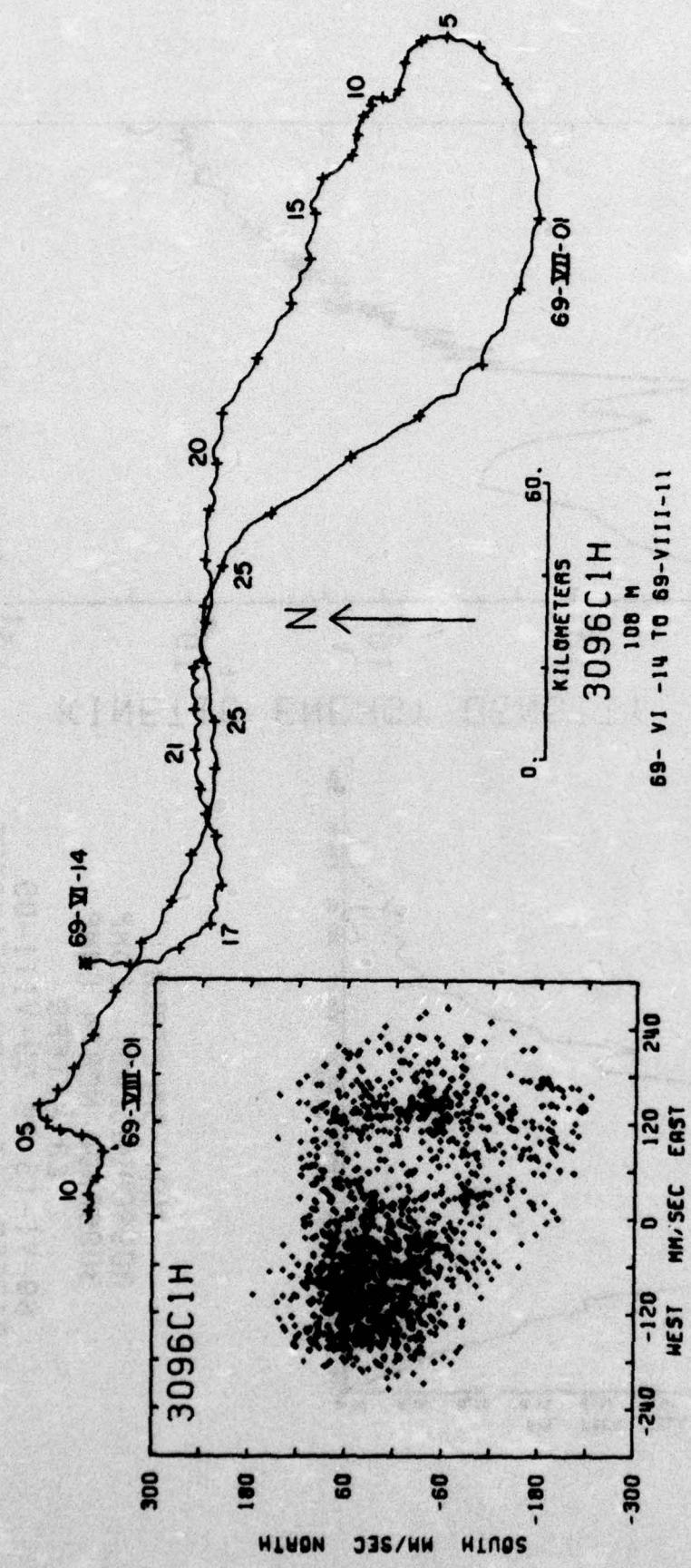
UNITS OF RAW DATA VARIABLES = M/M SEC

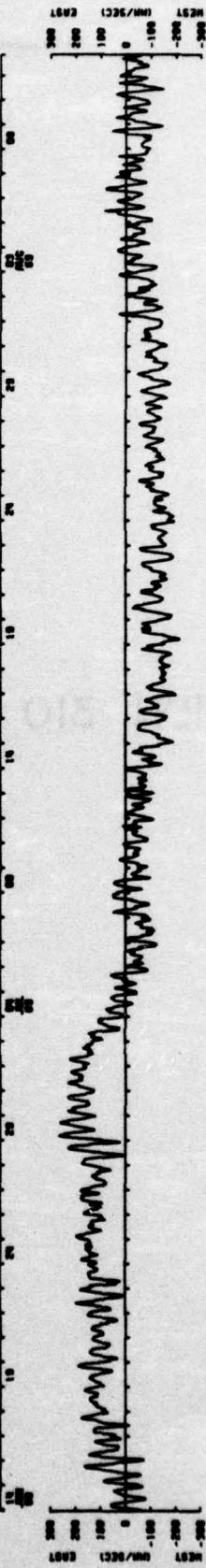
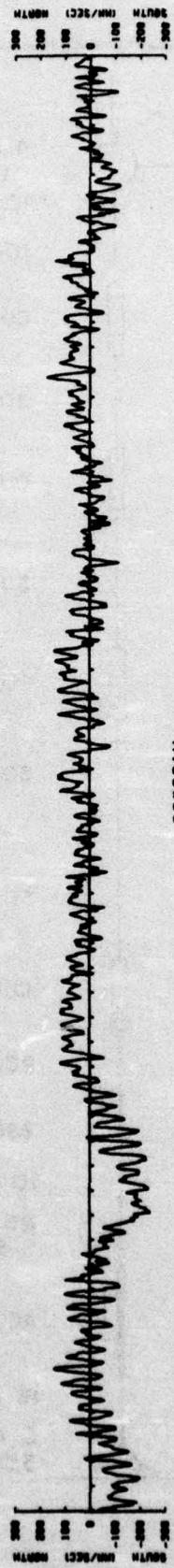
SAMPLE SIZE = 5005 POINTS

SPANNING RANGE
FROM 69-VI-13 210850
TO 69-VIII-11 210850

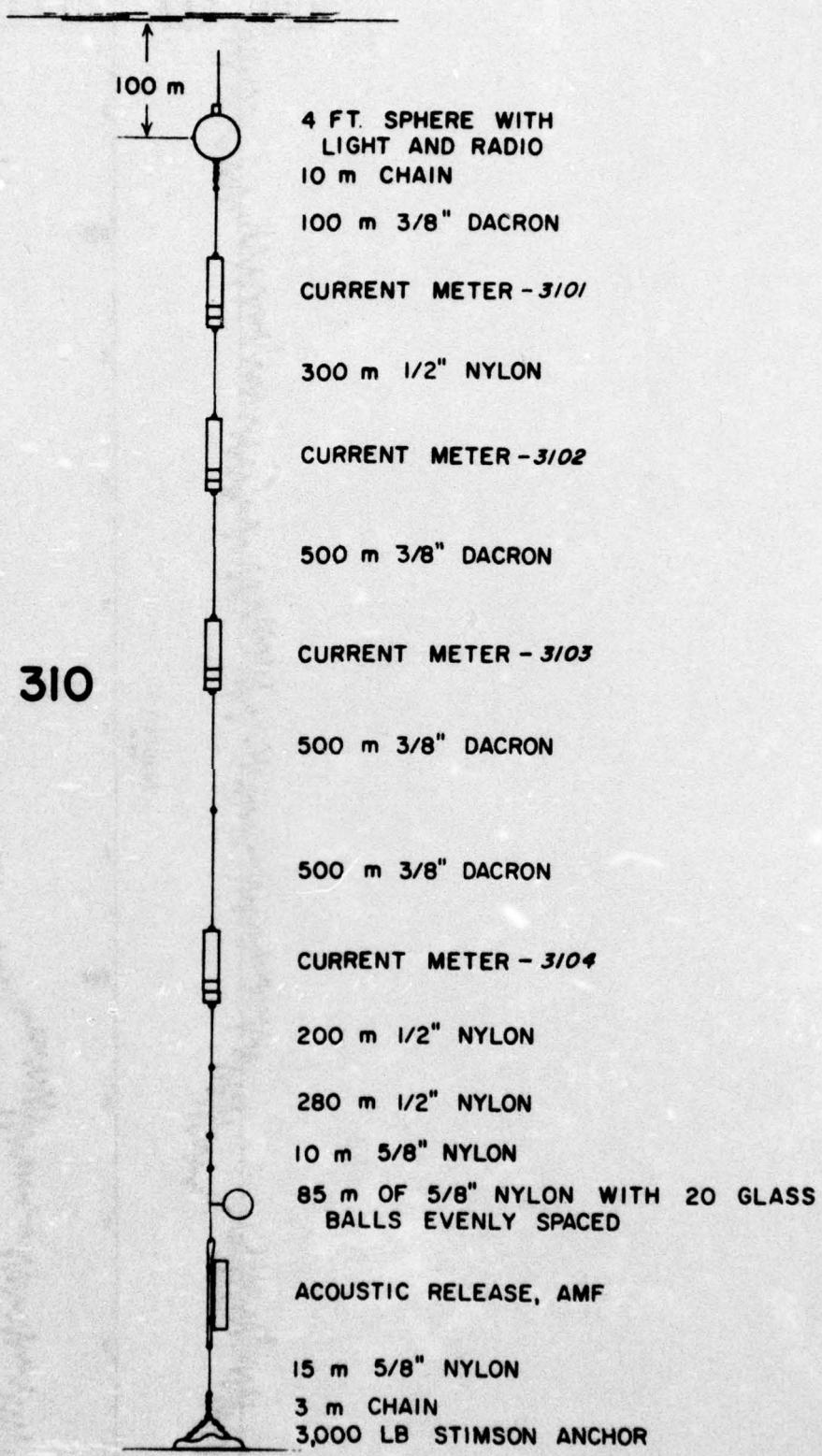
DURATION 59 DAYS 0 H 0 M 0 S







STATION 310



Mooring No. 310

Set 69 Aug 11 39° 10.0N 70° 02.5W
Year Month Day Latitude Longitude

Set by R. Heinmiller Ship R. V. Chain Cruise 95

Retrieved 70 Jan 04
Year Month Day

Retrieved by R. Heinmiller Ship R. V. Chain Cruise 97

Purpose of Mooring: Four months current measurements at Site D.

Mooring Type: Subsurface 4 foot sphere.

<u>Data Number</u>	<u>Instrument Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3101*	M-142	M.C.M.	200	
3102*	M-175	M.C.M.	532	
3103*	M-215	M.C.M.	1044	
3104*	M-204	M.C.M.	2066	

Water depth 2683

Hydrographic Stations

R. V. Chain cruise 95 Station 922

COMMENTS ON MOORING:

Data number 3101

Instrument No.: M-142

Type: Magnetic tape current meter

Depth: 200 m

Water depth: 2683 m

Start time: 69-VIII-11 154600

Stop time: 69-IX-15 174600

Duration: 35d 2h

Sampling scheme: Interval

time between strobes = 5.27 seconds

no. of strobes per interval = 24

interval time = 1800 seconds

COMMENTS:

Digital clock - clock lost 1 minute 48 seconds over 5 month period.

Data becomes noisy after a month.

STATS

DATA/ 3101A1800

MEAN	EAST	NORTH	SPEED	= MEAN	EAST & NORTH	= MEAN
	4.88	24.57	81.88	= COVARIANCE		= 2370.40
STD. ERR.	1.83	1.58	1.28	= STD. ERR. OF COVARIANCE		= 143.47
VARIANCE	6204.04	4271.87	2741.41	= STD. DEV. OF COVARIANCE		= 5089.23
STD. DEV.	78.28	65.36	52.38	= CORRELATION COEFFICIENT		= .487
KURTOSIS	3.80	2.85	4.83	= VECTOR MEAN		= 25.07
SKENNESS	.95	.22	1.24	= VECTOR VARIANCE		= 5270.40
				= STD. DEV.		= 72.85

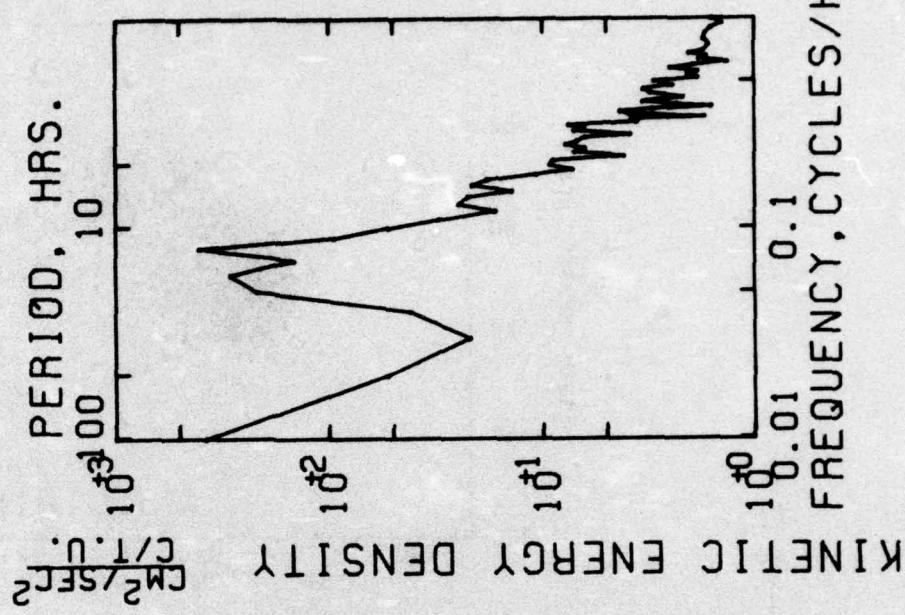
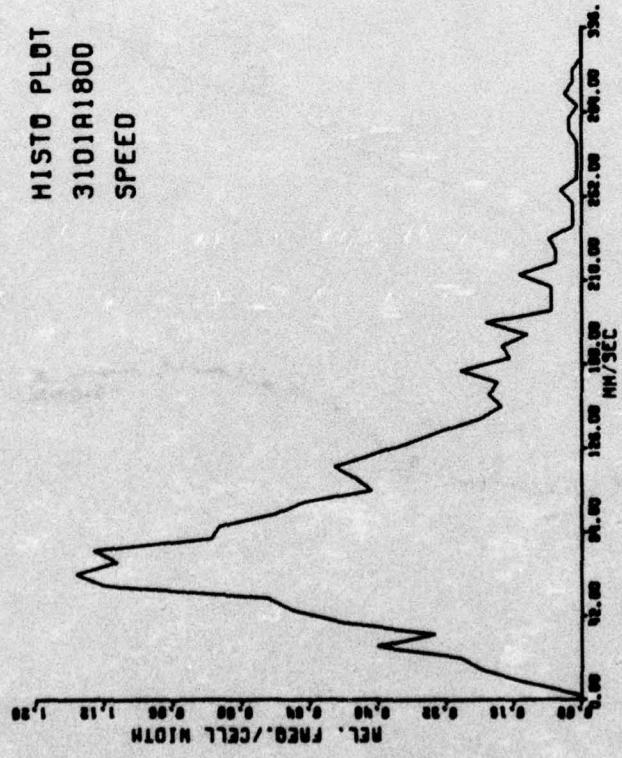
UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 1805 POINTS

SPANNING RANGE

FROM 69-VIII-11 15.48.00
TO 69- IX -15 17.48.00

DURATION 35 DAYS 2 H 0 M 0 S



AUTO SPECTRUM
3101A1800 EAST COMP
3101A1800 NORTH COMP
200 METERS
69-VIII-11 TO 69-IX-14
1 PIECES WITH 810 ESTIMATES
1 PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS

N
↑

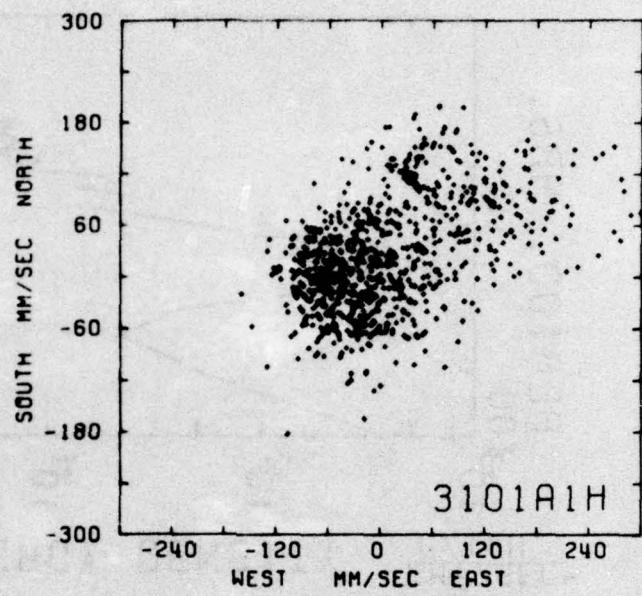
0. 20.
KILOMETERS

3101A1H

200 M

69-VIII-12 TO 69- IX -15

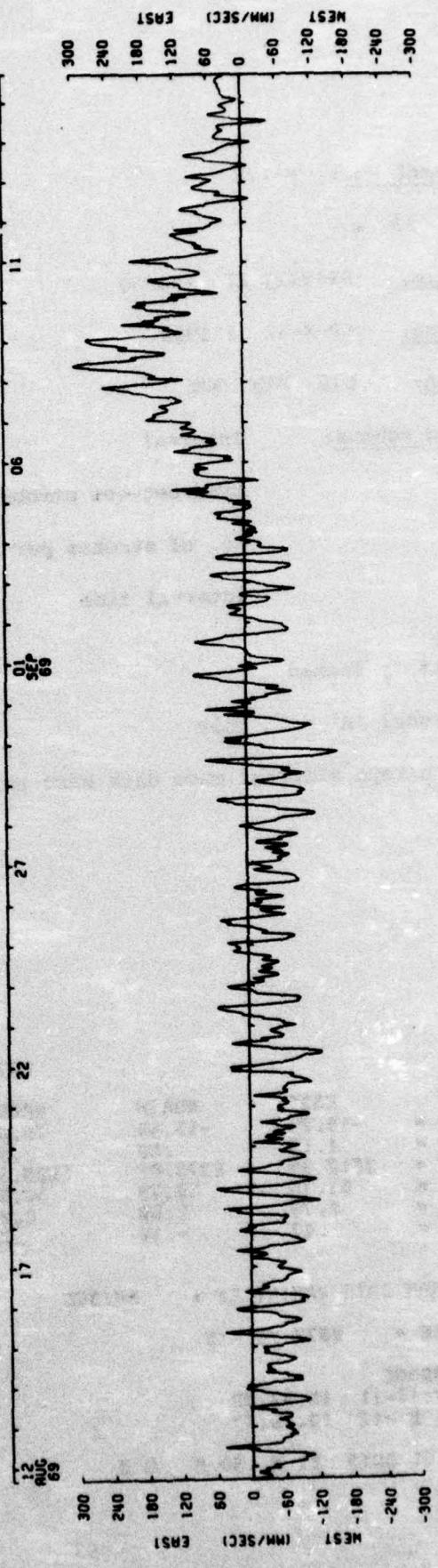
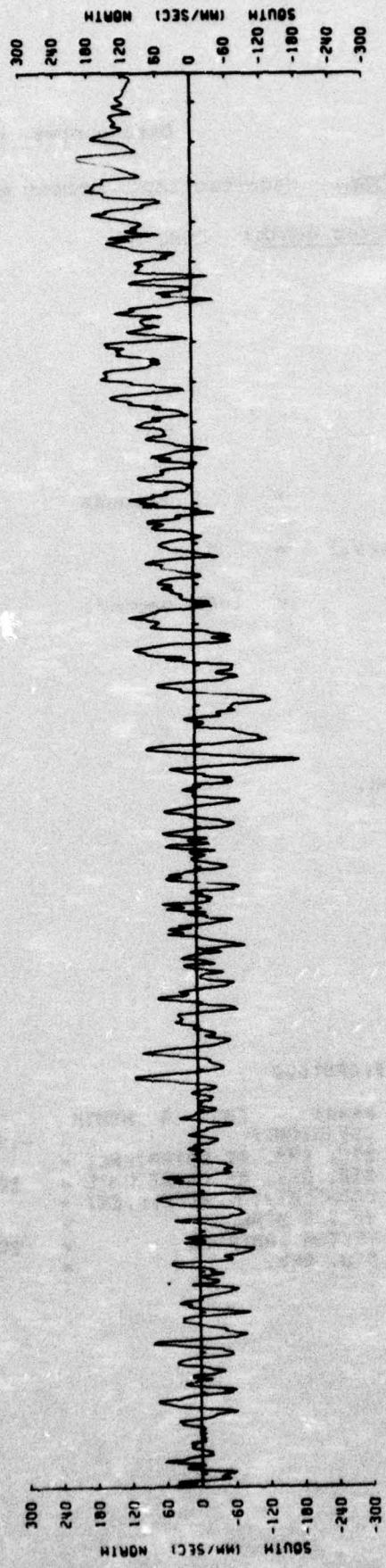
05
31
69-09-01



15

10

69-08-12



3101A1H
200 M

Data number 3102

Instrument No.: M-175

Type: Magnetic tape current meter

Depth: 532 m

Water depth: 2683 m

Start time: 69-VIII-11 154900

Stop time: 69-X-12 131900

Duration: 61d 21h 30m

Sampling scheme: Interval

time between strobos = 5 seconds

no. of strobos per interval = 24

interval time = 1800 seconds

COMMENTS:

Battery leaked

Channel 'A' data only

Much tape slippage made data hard to read.

STATS

MEAN	-18.24	EAST	NORTH
STD. ERR.	1.13	-15.44	.00
VARIANCE	3812.00	2375.01	
STD. DEV.	61.75	46.73	
KURTOSIS	2.79	2.50	
SKEWNESS	.42	-.14	

DRTR/ 310201000

SPEED	#	MEAN	EAST & NORTH	MEAN
75.07	#	COVARIANCE		-1368.68
.81	#	STD. ERR. OF COVARIANCE		55.96
1123.12	#	STD. DEV. OF COVARIANCE		3050.62
33.51	#	CORRELATION COEFFICIENT		-.454
2.84	#	VECTOR MEAN		23.80
.81	#	VECTOR VARIANCE		3093.85
	#	STD. DEV.		55.62

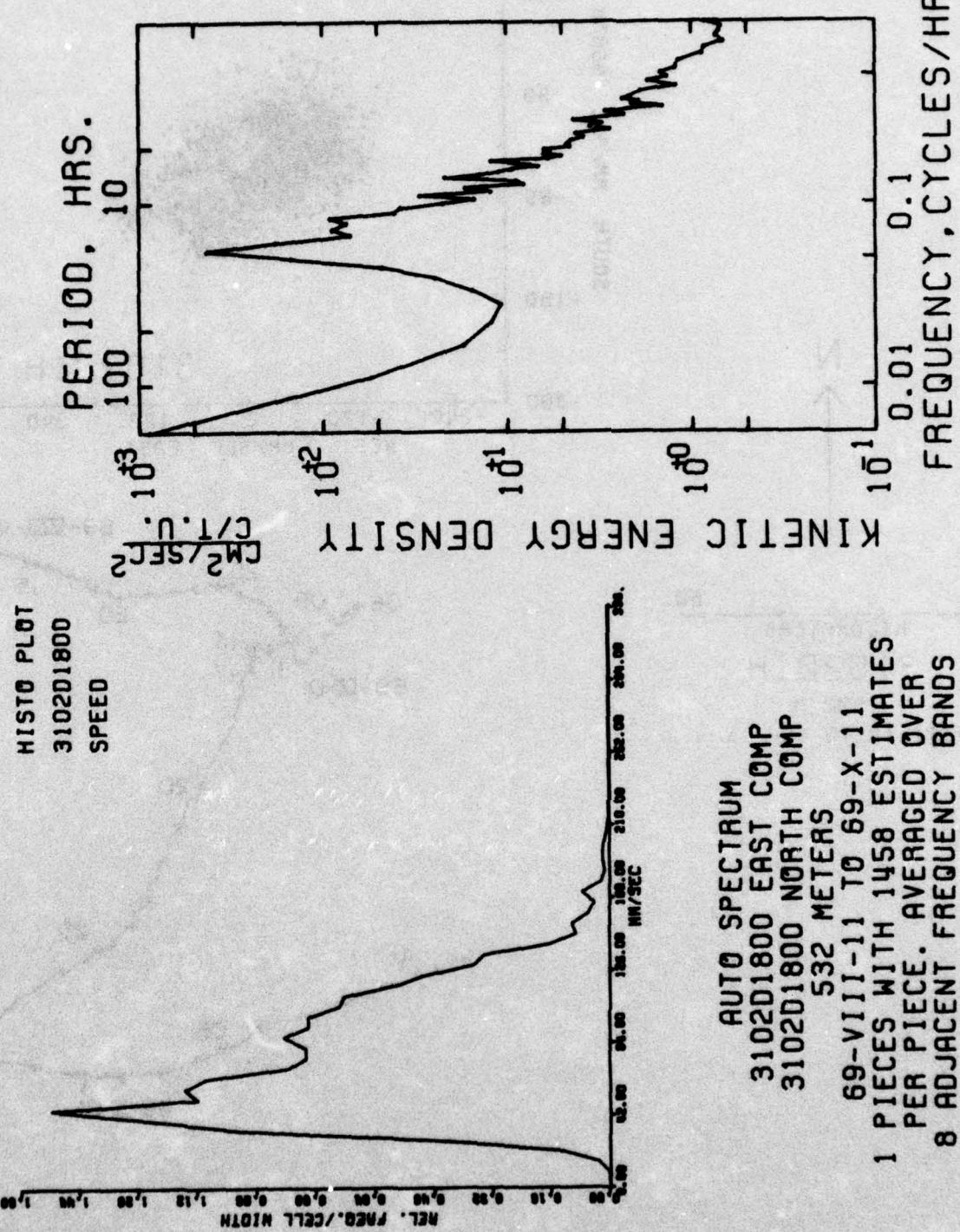
UNITS OF RAW DATA VARIABLES = MM/SEC

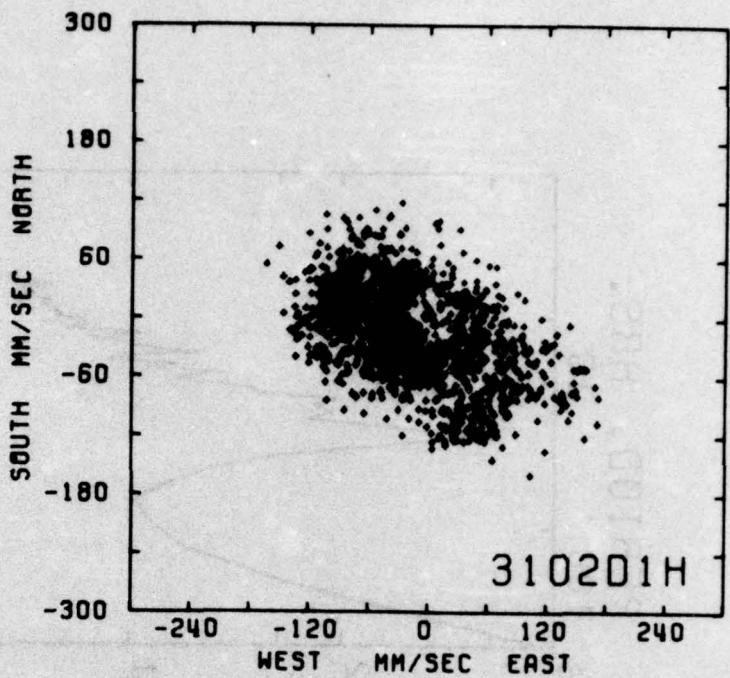
SAMPLE SIZE = 2872 POINTS

SPANNING RANGE

FROM 69-VIII-11 15.00.00
TO 69-X-12 13.18.00

DURATION 61 DAYS 21 H 30 M 0 S



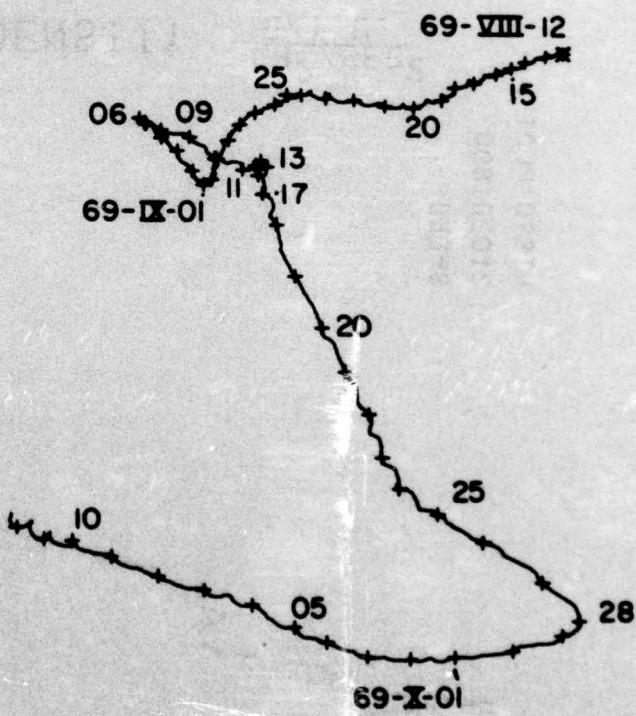


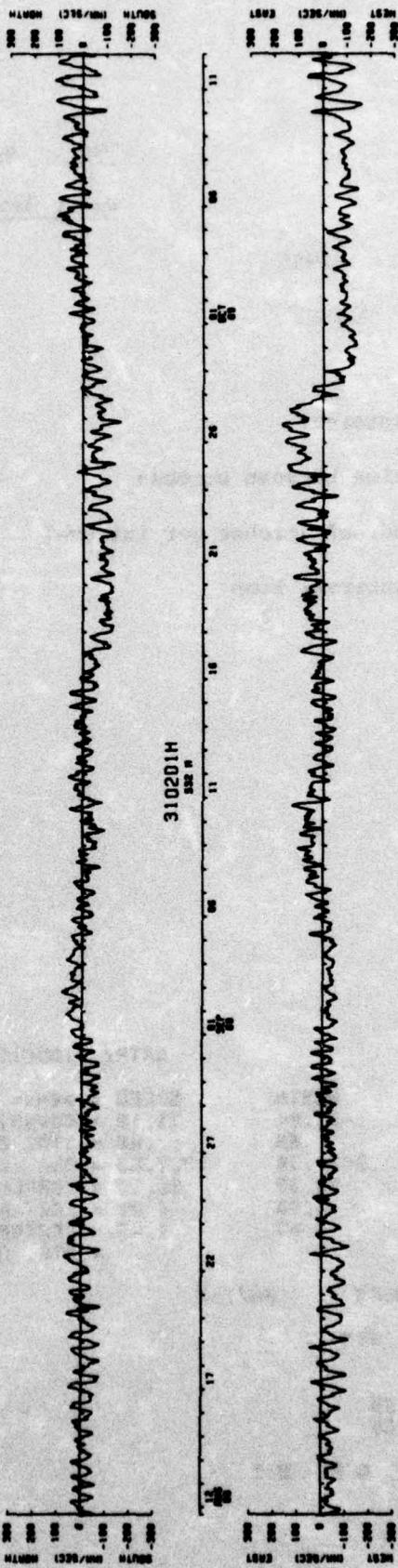
N

0. — KILOMETERS
3102D1H

532 M

69-VIII-12 TO 69- X -12





Data number 3103

Instrument No.: M-215

Type: Magnetic tape current meter

Depth: 1044 m

Water depth: 2683 m

Start time: 69-VIII-11 182955

Stop time: 69-XII-07 012955

Duration: 117d 7h

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 1800 seconds

COMMENTS:

STATS

	EAST	NORTH
MEAN	-30.88	-17.84
STD. ERR.	.67	.68
VARIANCE	2540.70	2588.74
STD. DEV.	50.41	50.88
KURTOSIS	3.10	4.00
SKENNESS	.38	-.87

DATA/ 3103C1800

	EAST & NORTH	
SPEED	= 00000	MEAN
71.12	= COVARIANCE	-717.54
.48	= STD. ERR. OF COVARIANCE	48.21
1327.43	= STD. DEV. OF COVARIANCE	3682.96
.9843	= CORRELATION COEFFICIENT	-.281
6.01	= VECTOR MEAN	35.71
1.45	= VECTOR VARIANCE	2555.26
	= STD. DEV.	50.55

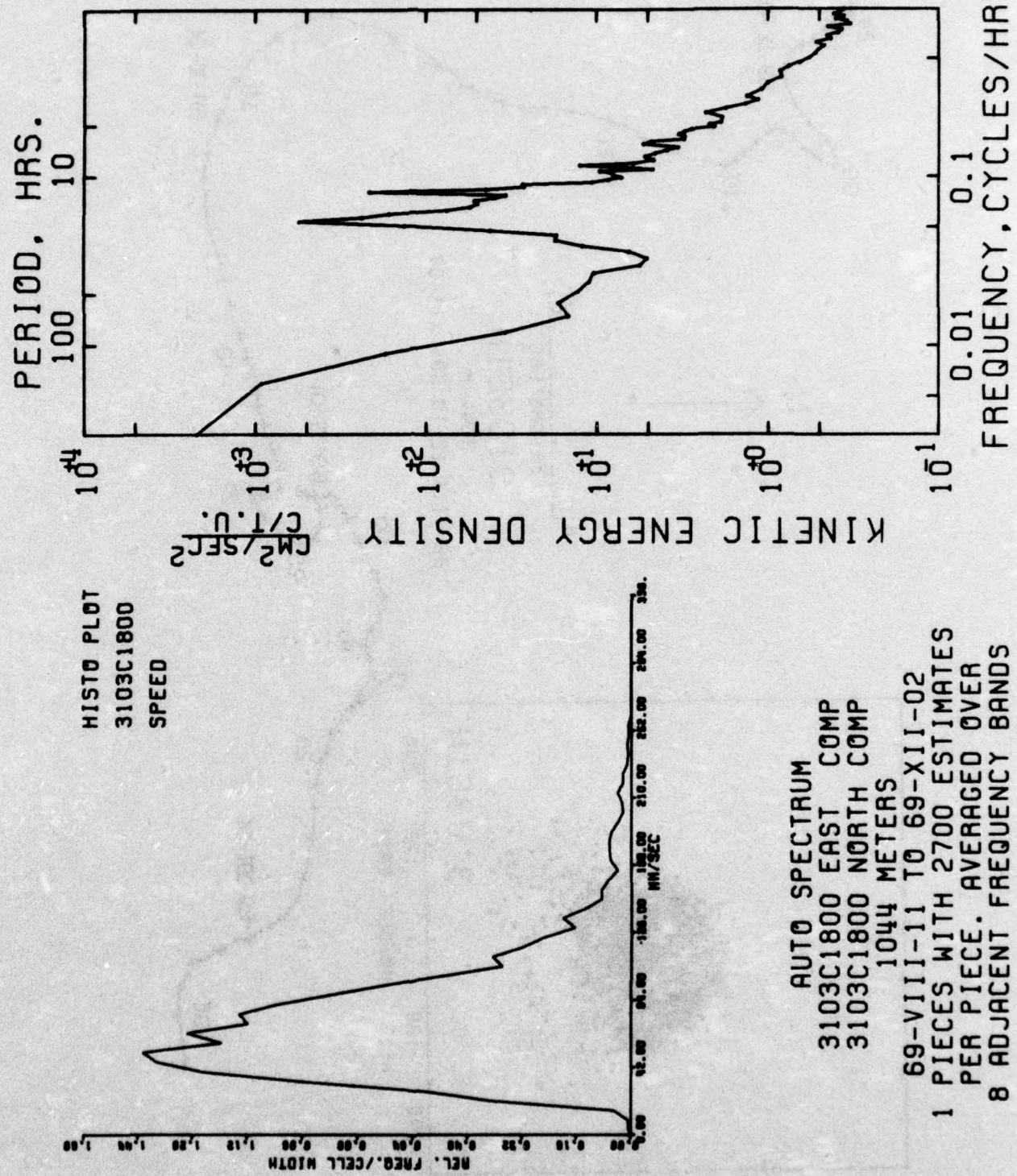
UNITS OF RAW DATA VARIABLES = MM/SEC

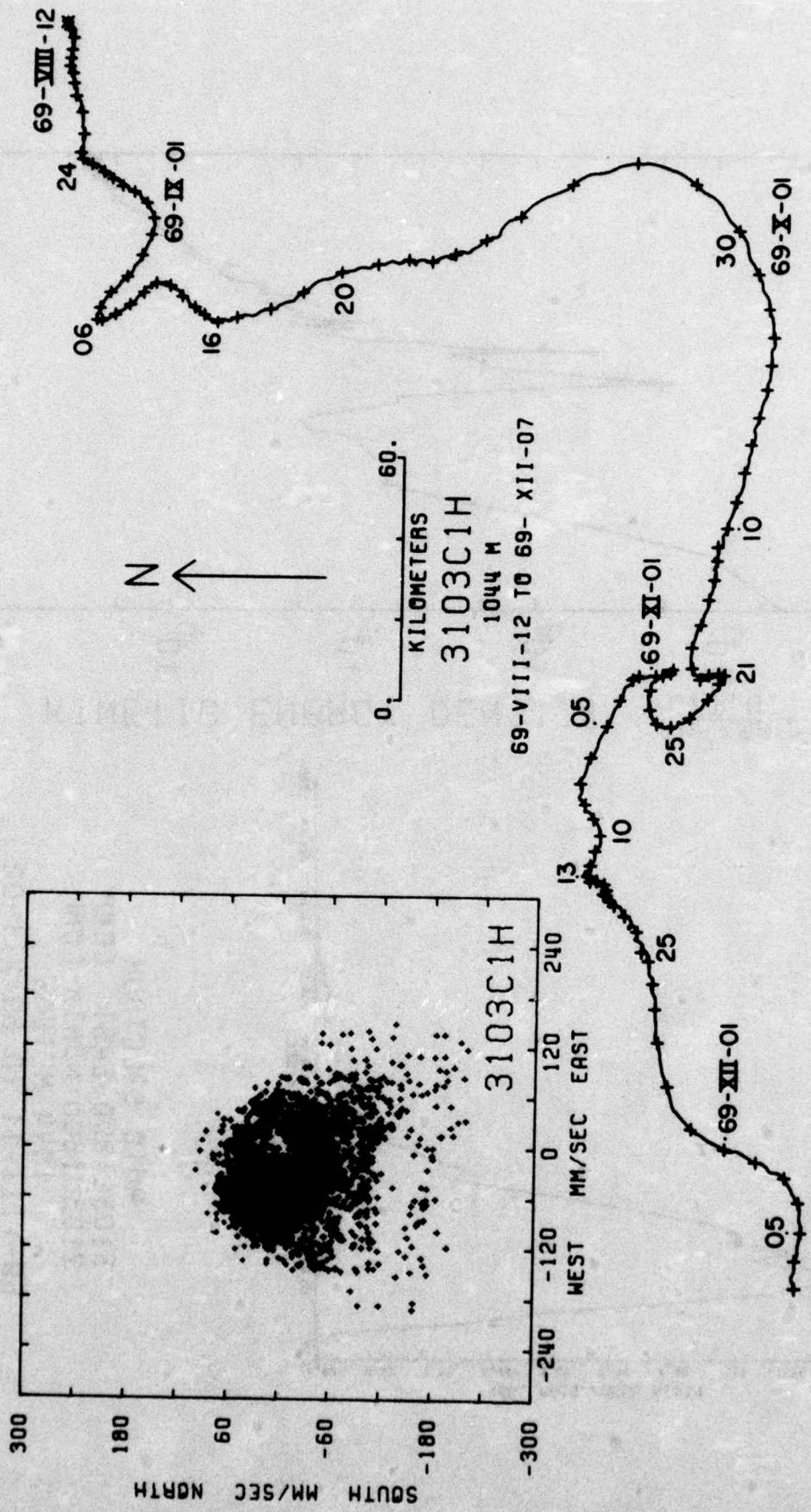
SAMPLE SIZE = 5631 POINTS

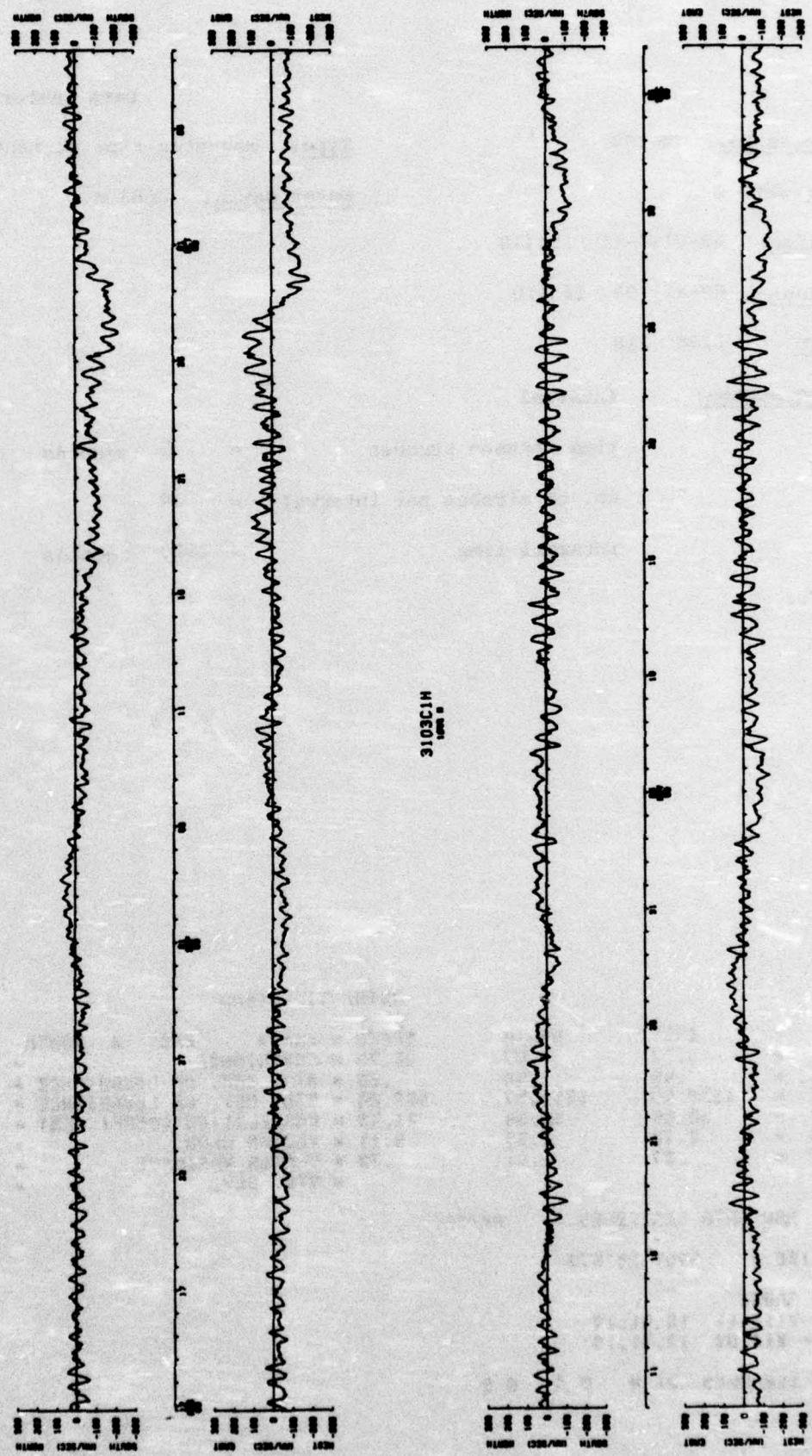
SPANNING RANGE

FROM 69-VIII-11 18.29.55
TO 69-XII-07 01.29.55

DURATION 117 DAYS 7 H 0 M 0 S







Data number 3104

Instrument No.: M-204

Type: Magnetic tape current meter

Depth: 2066 m

Water depth: 2683 m

Start time: 69-VIII-11 154110

Stop time: 69-XII-08 124110

Duration: 118d 21h

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 1800 seconds

COMMENTS:

STATS

	EAST	NORTH
MEAN	-18.73	.07
STD. ERR.	.48	.48
VARIANCE	1938.40	1281.37
STD. DEV.	38.08	35.04
KURTOSIS	2.72	2.55
SKEWNESS	.37	-.01

DATA/ 310401800

	EAST & NORTH	
SPEED	= #####	
= 48.70	= COVARIANCE	= #####
= .28	= STD. ERR. OF COVARIANCE	= -374.70
= 458.24	= STD. DEV. OF COVARIANCE	= 18.43
= 21.43	= CORRELATION COEFFICIENT	= 1487.08
= 3.11	= VECTOR MEAN	= -.283
= .72	= VECTOR VARIANCE	= 18.73
= #####	= STD. DEV.	= 1924.08
		= 38.08

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 5707 POINTS

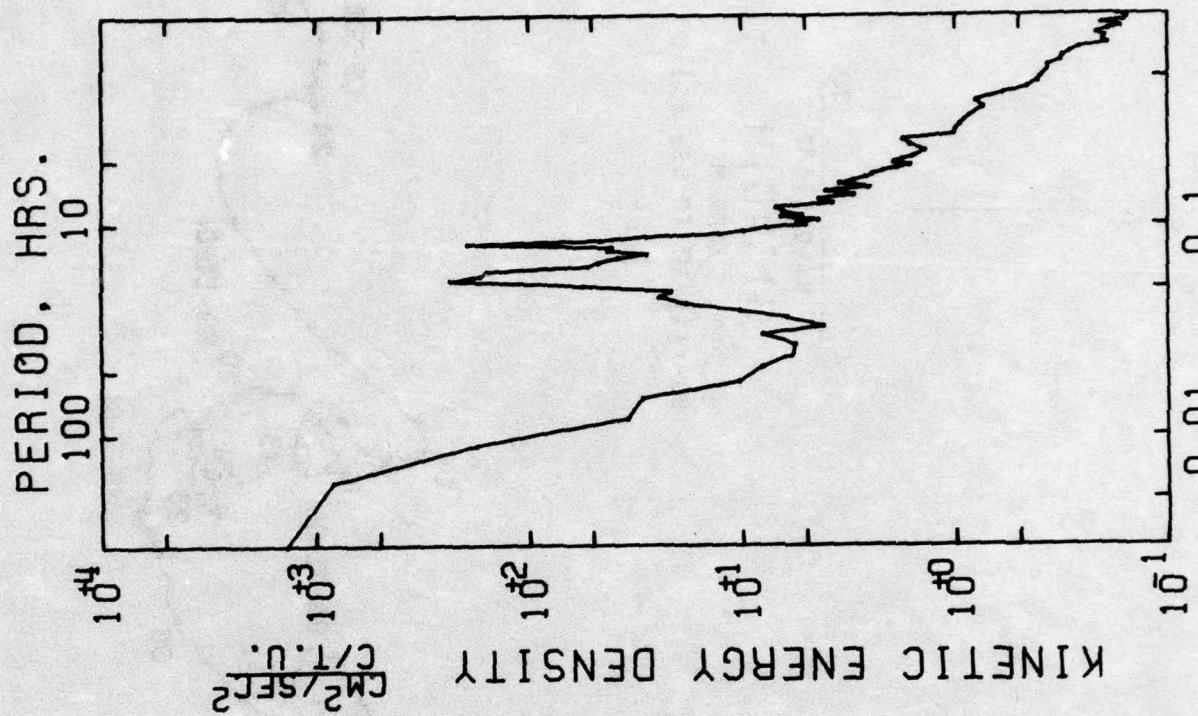
SPANNING RANGE

FROM 69-VIII-11 15.41.10
TO 69-XII-08 12.41.10

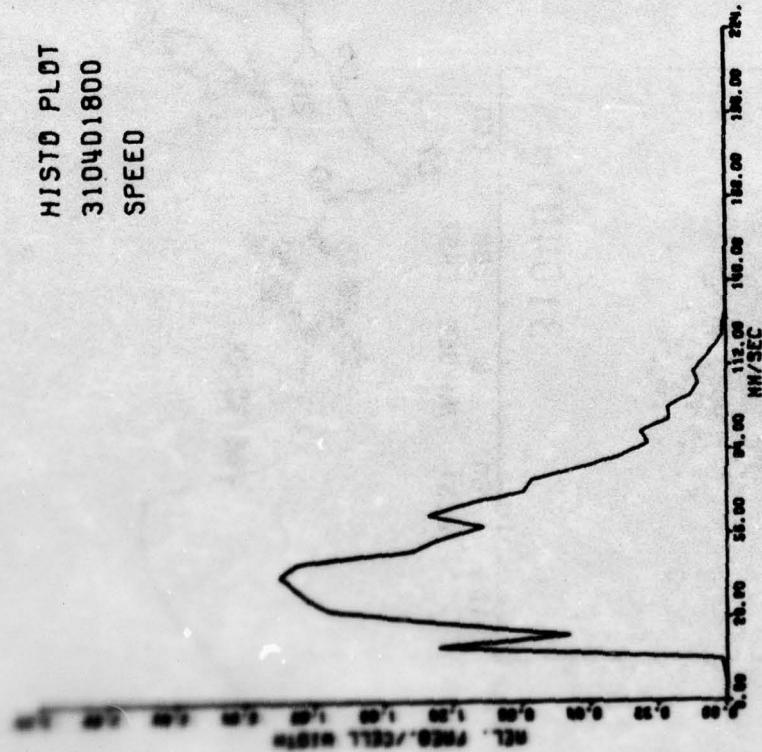
DURATION :18 DAYS 21 H 0 M 0 S

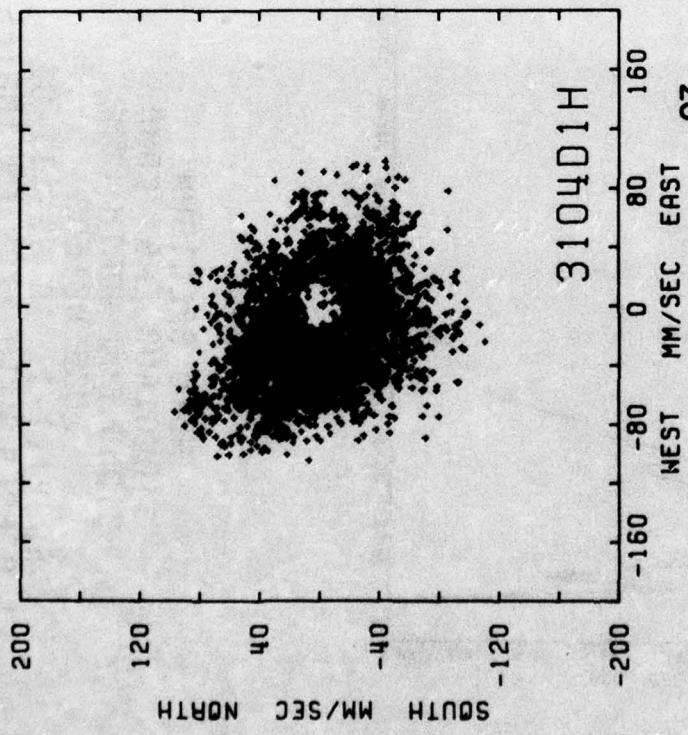
HISTO PLOT

3104D1800
SPEED



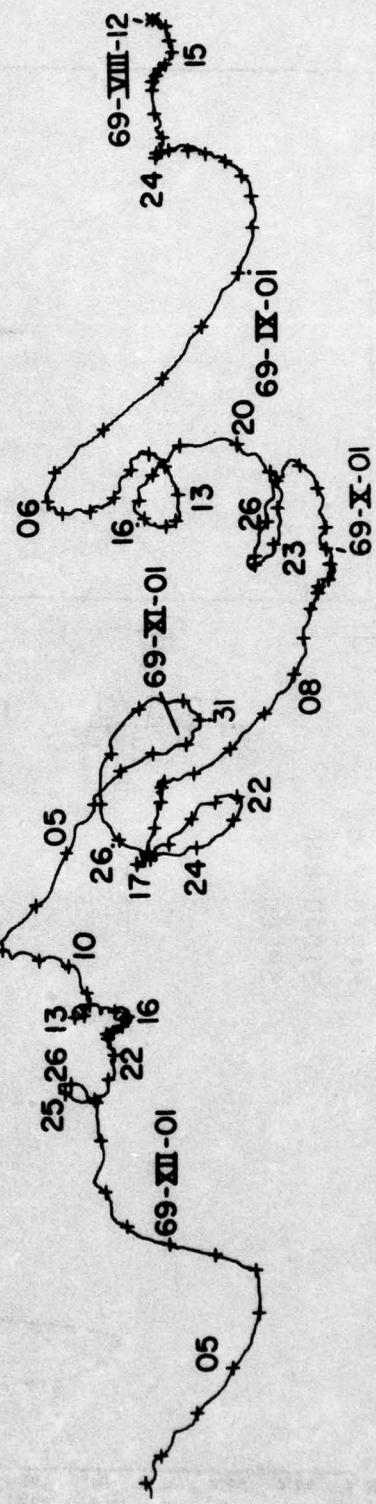
AUTO SPECTRUM
3104D1800 EAST COMP
3104D1800 NORTH COMP
2066 METERS
69-VIII-11 TO 69-XI-02
1 PIECES WITH 2700 ESTIMATES
1 PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS

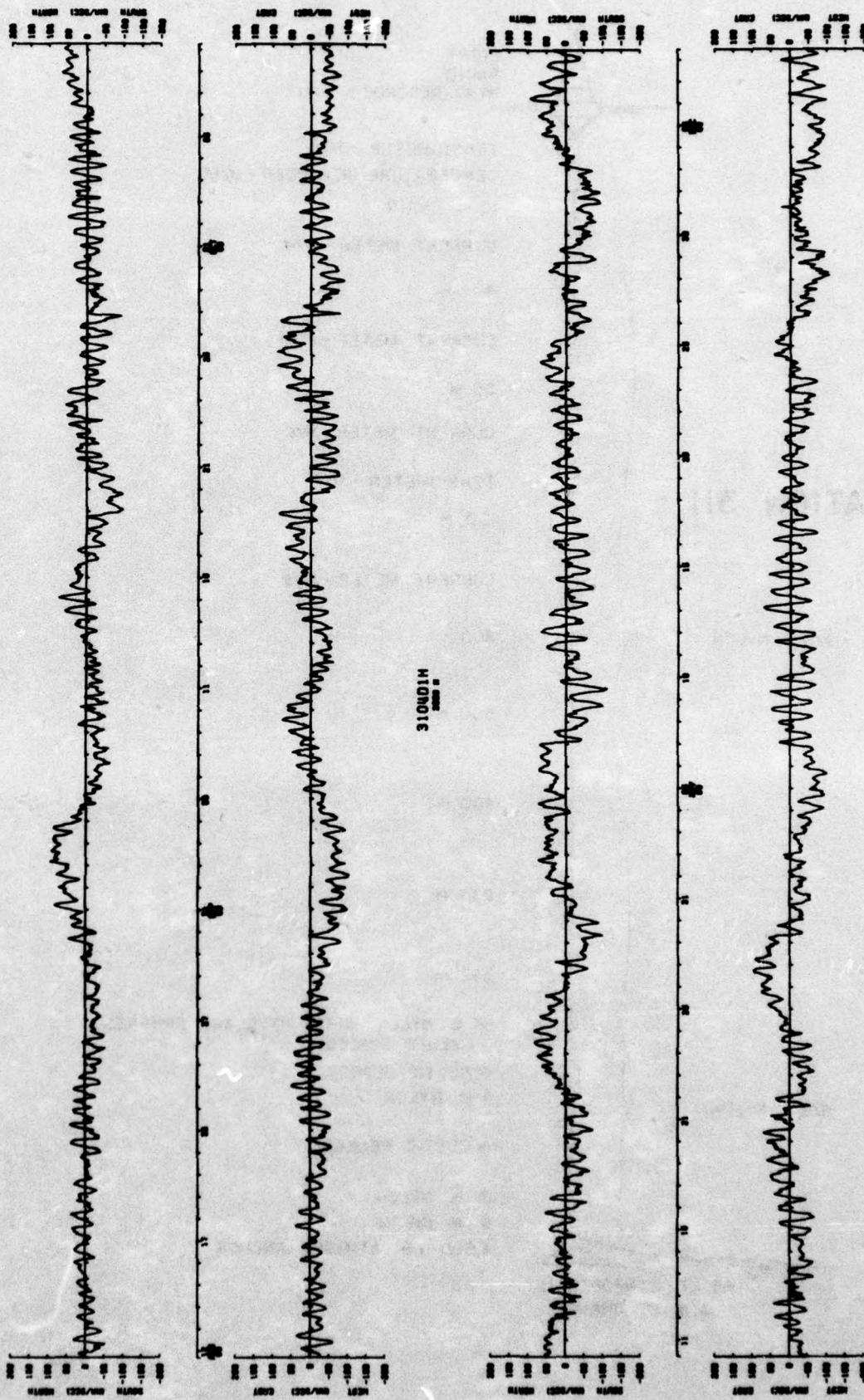




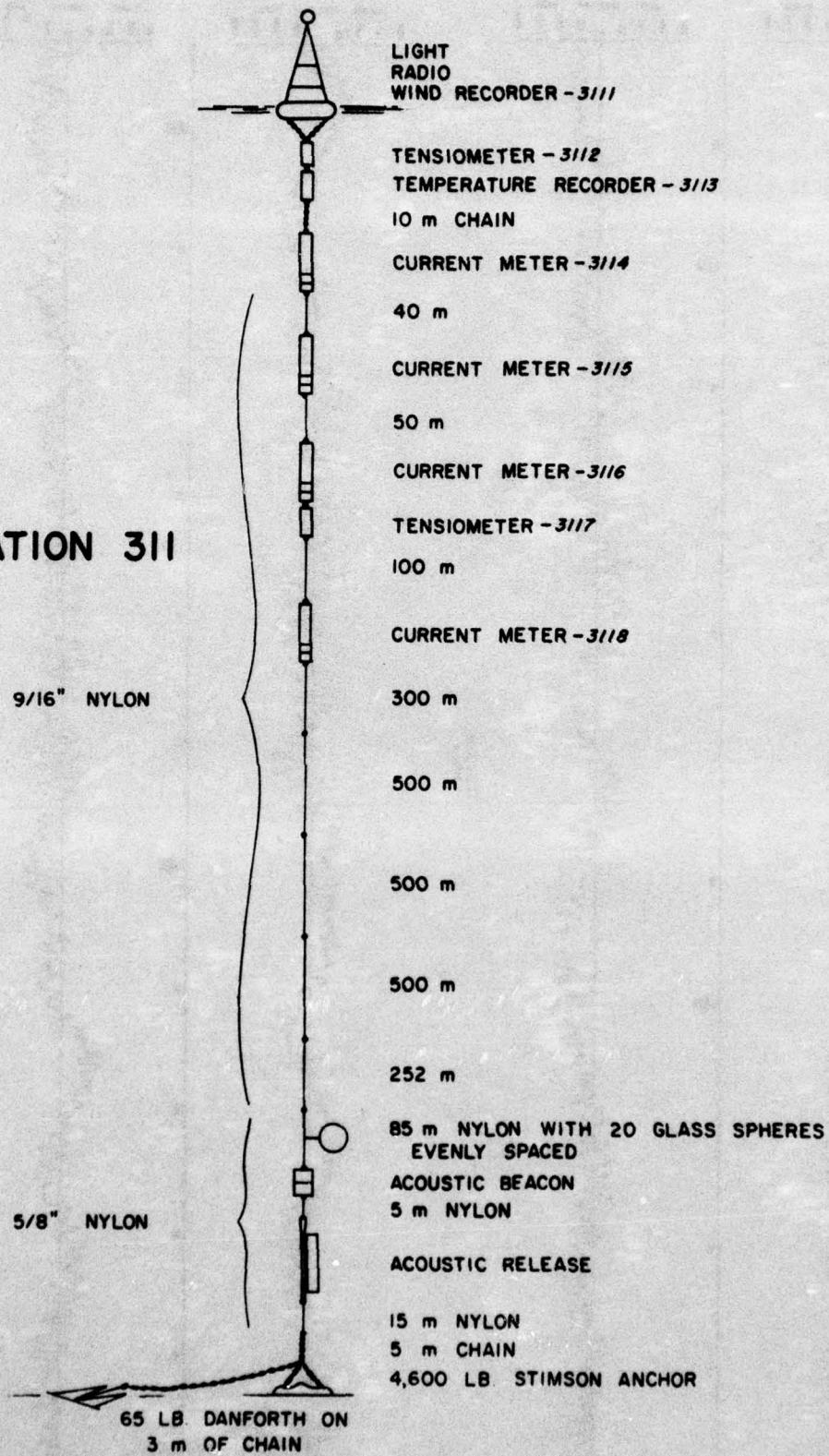
N
↑
0. KILOMETERS
30.

3104D1H
2066 M
69-VIII-12 10 69-XII-08





STATION 311



Mooring No. 311

Set 69 Aug 11 39° 11.2N 70° 04.9W
Year Month Day Latitude Longitude

Set by R. Heinmiller Ship R. V. Chain Cruise 95

Retrieved 69 Oct 06
Year Month Day

Retrieved by J. Gifford Ship R. V. Atlantis II Cruise 53

Purpose of Mooring: Current measurements at Site D.

Mooring Type: Surface mooring - toroid

<u>Data Number</u>	<u>Instrument Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3111	W-119X	M.W.R.	0	Lost
3112	1016	Tens.	3	
3113	T-456	Temp.	3	
3114	M-208	M.C.M.	15	Lost
3115	M-191	M.C.M.	56	Instrument was recording double records
3116*	M-206	M.C.M.	108	
3117	1014	Tens.	109	
3118	M-220	M.C.M.	210	Compass and vane zero after 3 weeks
Water depth			2685	

Hydrographic Station

R. V. Atlantis II cruise 53 Station 1550

COMMENTS ON MOORING:

Mooring recovered using back-up recovery system. Tensiometer reading indicates great strain on mooring September 16, 1969. Top 50 meters of mooring considered stolen.

Data number 3116

Instrument No.: M-206

Type: Magnetic tape current meter

Depth: 108 m

Water depth: 2685 m

Start time: 69-VIII-11 224800

Stop time: 69-IX-17 121800

Duration: 36d 13h 30m

Sampling scheme: Interval

time between strobos = 5 seconds

no. of strobos per interval = 24

interval time = 1800 seconds

COMMENTS:

STATS

MEAN	EAST	NORTH
-	12.28	41.24
STD. ERR.	2.51	2.26
VARIANCE	11084.16	8008.57
STD. DEV.	105.33	94.91
KURTOSIS	2.89	2.48
SKEWNESS	.53	.11

DATA/ 3116C1800

SPEED	=	MM/MM	EAST & NORTH	=	MM/MM
181.70	=	COVARIANCE		=	4329.51
1.02	=	STD. ERR. OF COVARIANCE		=	235.51
4800.84	=	STD. DEV. OF COVARIANCE		=	8873.35
57.09	=	CORRELATION COEFFICIENT		=	.432
2.89	=	VECTOR MEAN		=	49.09
.52	=	VECTOR VARIANCE		=	10051.98
	=	STD. DEV.		=	100.26

UNITS OF RAW DATA VARIABLES = MM/SEC

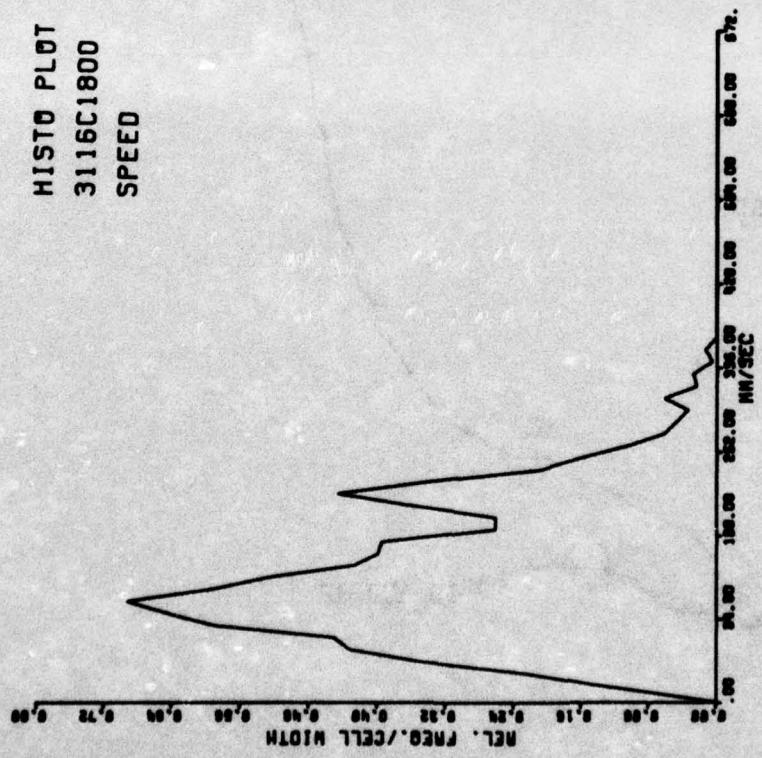
SAMPLE SIZE = 1756 POINTS

SPANNING RANGE

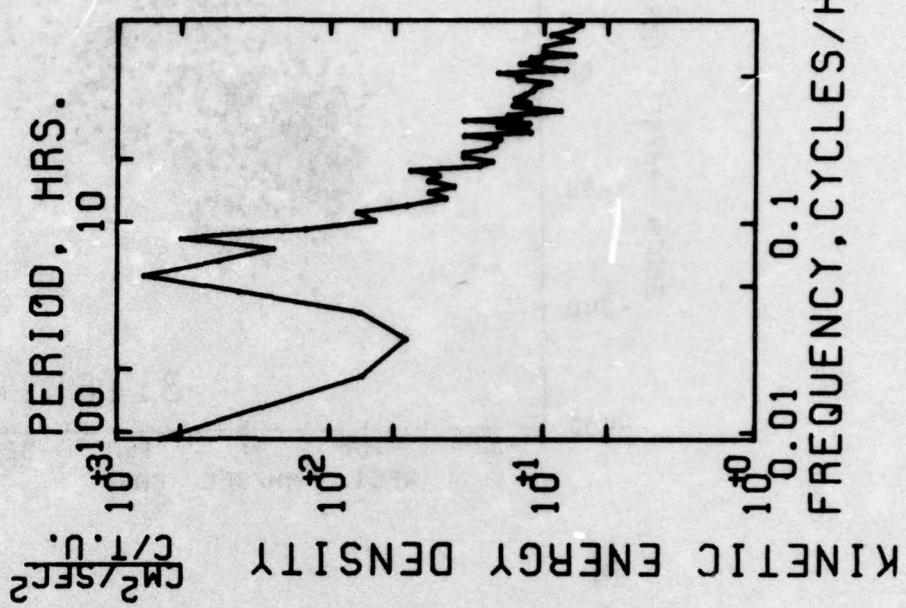
FROM 69-VIII-11 22.48.00
TO 69-IX-17 12.18.00

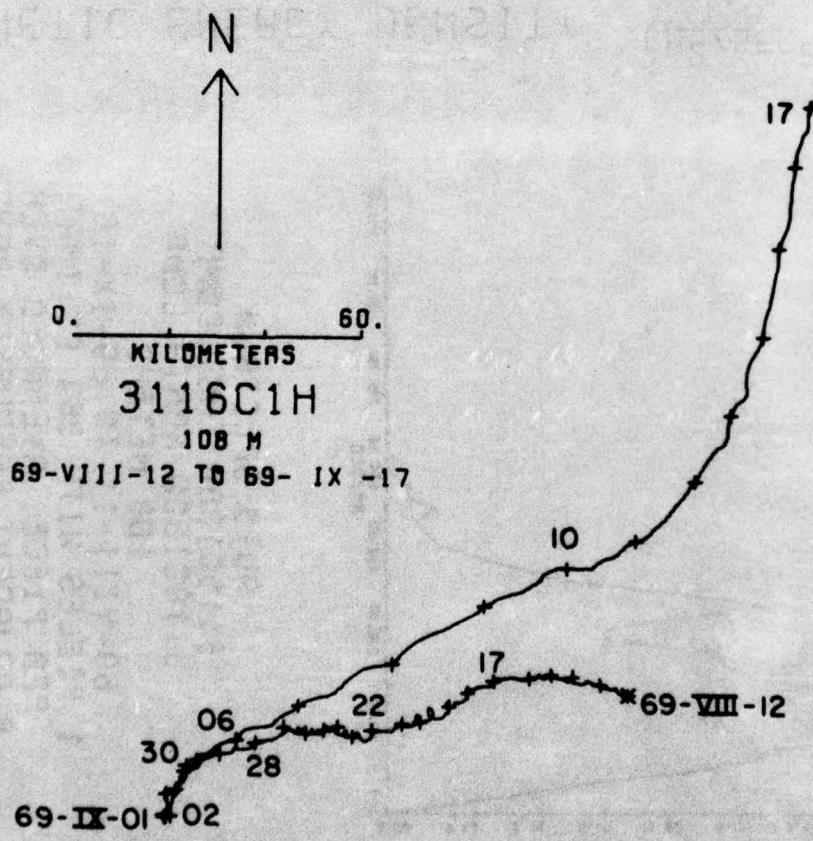
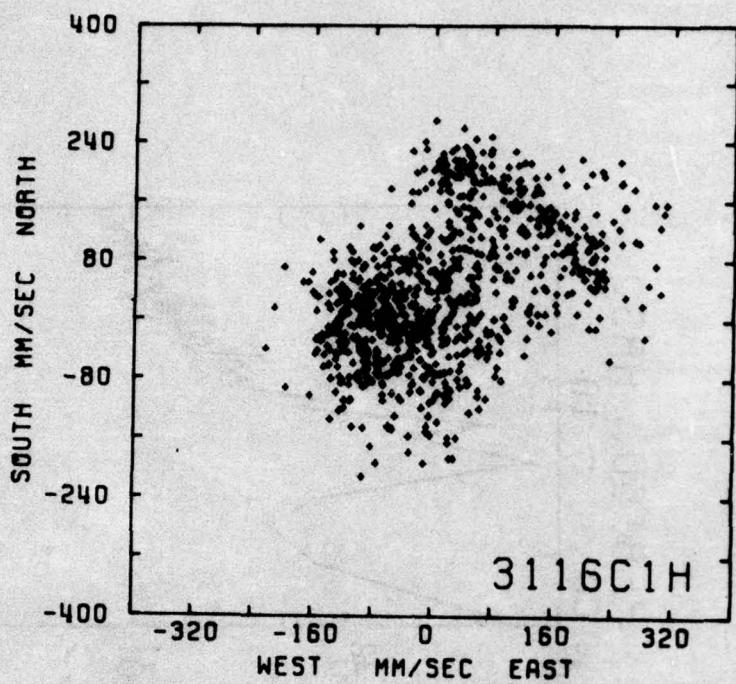
DURATION 36 DAYS 13 H 30 M 0 S

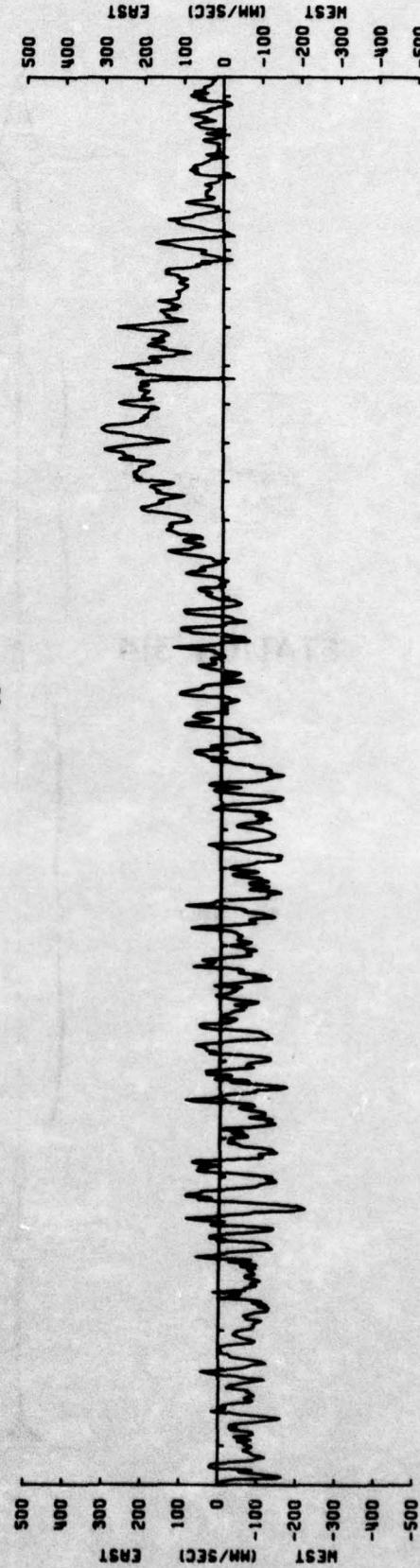
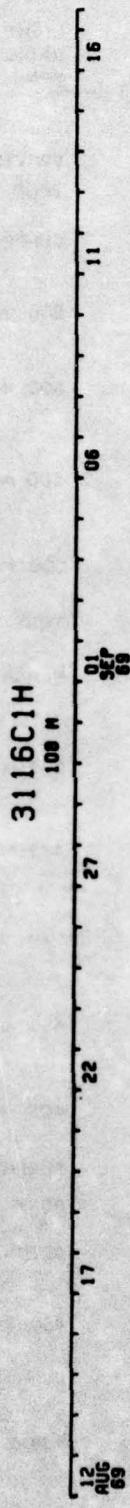
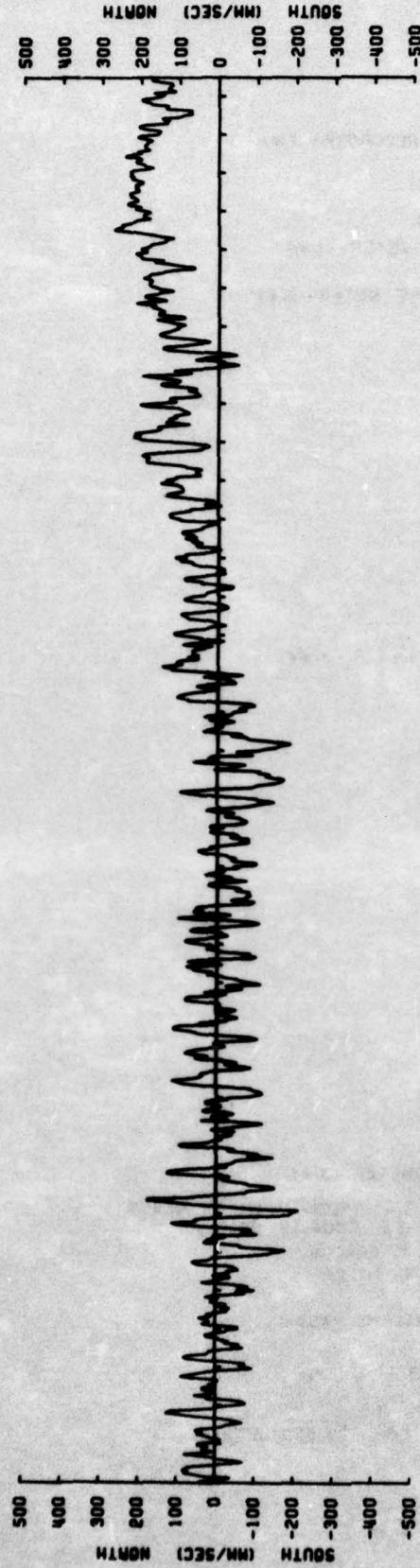
HISTO PLOT
3116C1800
SPEED

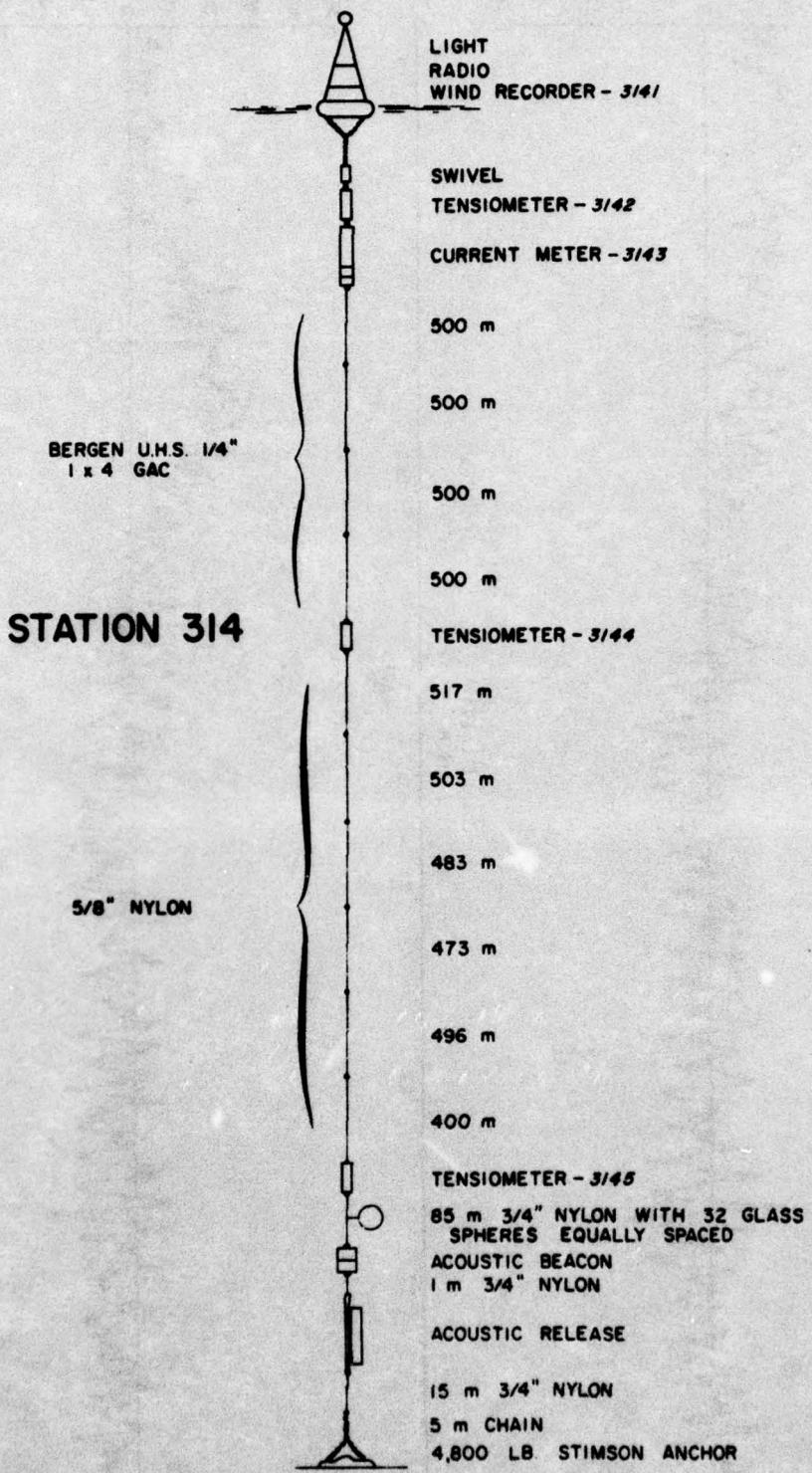


AUTO SPECTRUM
3116C1800 EAST COMP
3116C1800 NORTH COMP
108 METERS
69-VIII-11 TO 69-IX-16
1 PIECES WITH 864 ESTIMATES
1 PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS









Mooring No. 314

Set 69 Aug 18
Year Month Day

34° 02.7N
Latitude

70° 02.0W
Longitude

Set by R. Heinmiller

Ship R. V. Chain

Cruise 95

Retrieved 69 Oct 8
Year Month Day

Retrieved by J. Gifford Ship R. V. Atlantis II Cruise 53

Purpose of Mooring: Two month wire test at Site L.

Mooring Type: Surface mooring - toroid.

<u>Data Number</u>	<u>Instrument Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3141*	W-169X	M.W.R.	-0-	
3142	1025	Tens	13	
3143*	M-198	M.C.M.	14	
3144	1026	Tens	2015	
3145	1027	Tens	5259	
Water depth			5368	

Hydrographic Station

R. V. Chain cruise 95 Station 924

R. V. Atlantis II cruise 53 Station 1551

COMMENTS ON MOORING:

Data number 3141

Instrument No.: W-169X

Type: Magnetic tape wind recorder

Depth: -0-

Water depth: 5368 m

Start time: 69-VIII-18 095950

Stop time: 69-X-09 014450

Duration: 51d 15h 45m

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

Wind direction follows ocean current conventions to facilitate comparisons;
add 180° to direction for meteorological readings.

STATS

	EAST	NORTH
MEAN	-13.86	-14.50
STD. ERA.	.61	.86
VARIANCE	1818.25	2181.72
STD. DEV.	42.62	46.49
KURTOSIS	2.53	2.85
SKENNESS	.81	.11

DATA/ 3141WF900

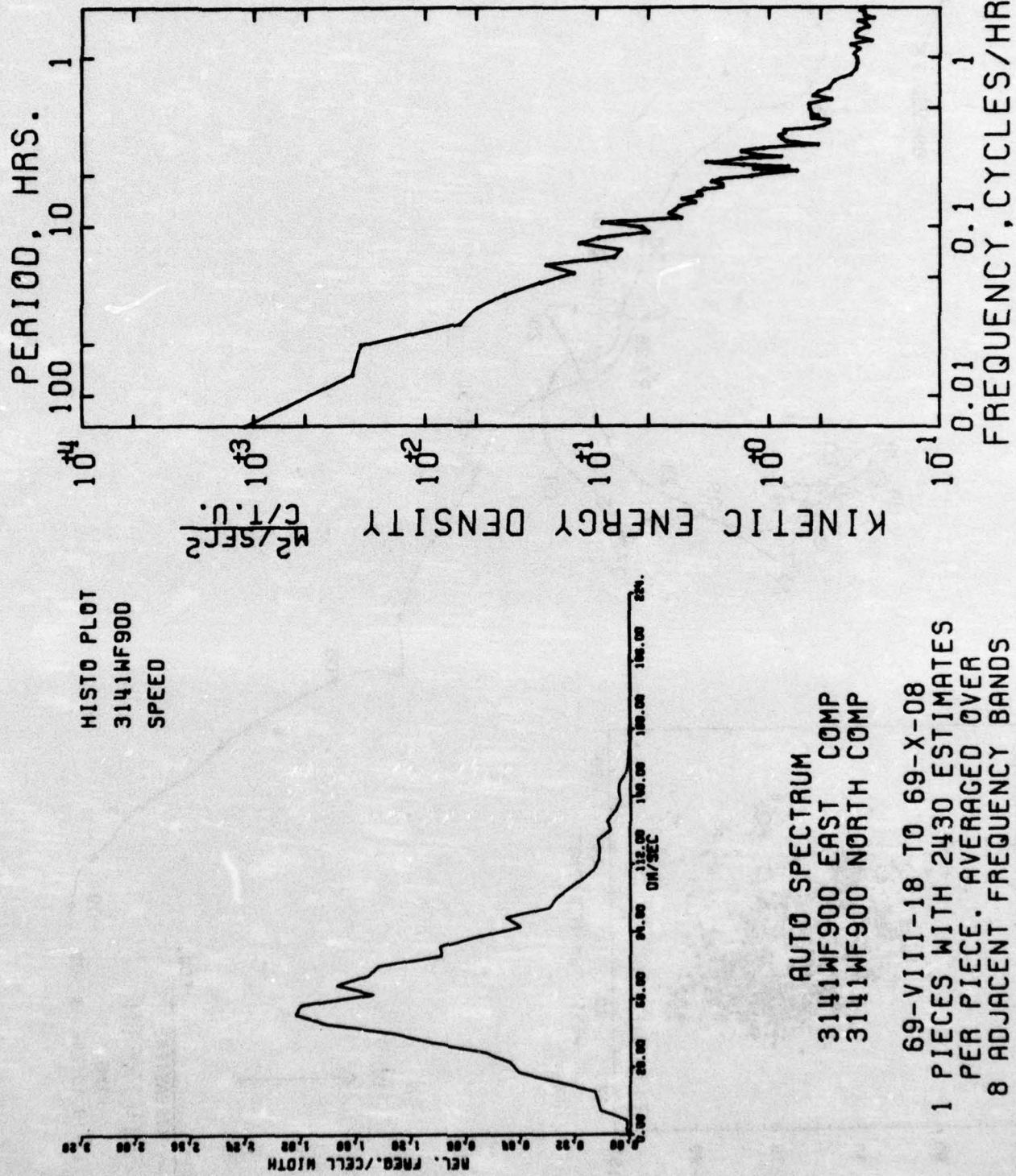
SPEED	=	EAST & NORTH	=	MEAN
61.30	=	COVARIANCE	=	408.18
.36	=	STD. ERA. OF COVARIANCE	=	38.38
825.19	=	STD. DEV. OF COVARIANCE	=	2199.87
25.00	=	CORRELATION COEFFICIENT	=	.207
3.86	=	VECTOR MEAN	=	20.13
.86	=	VECTOR VARIANCE	=	1988.99
	=	STD. DEV.	=	44.60

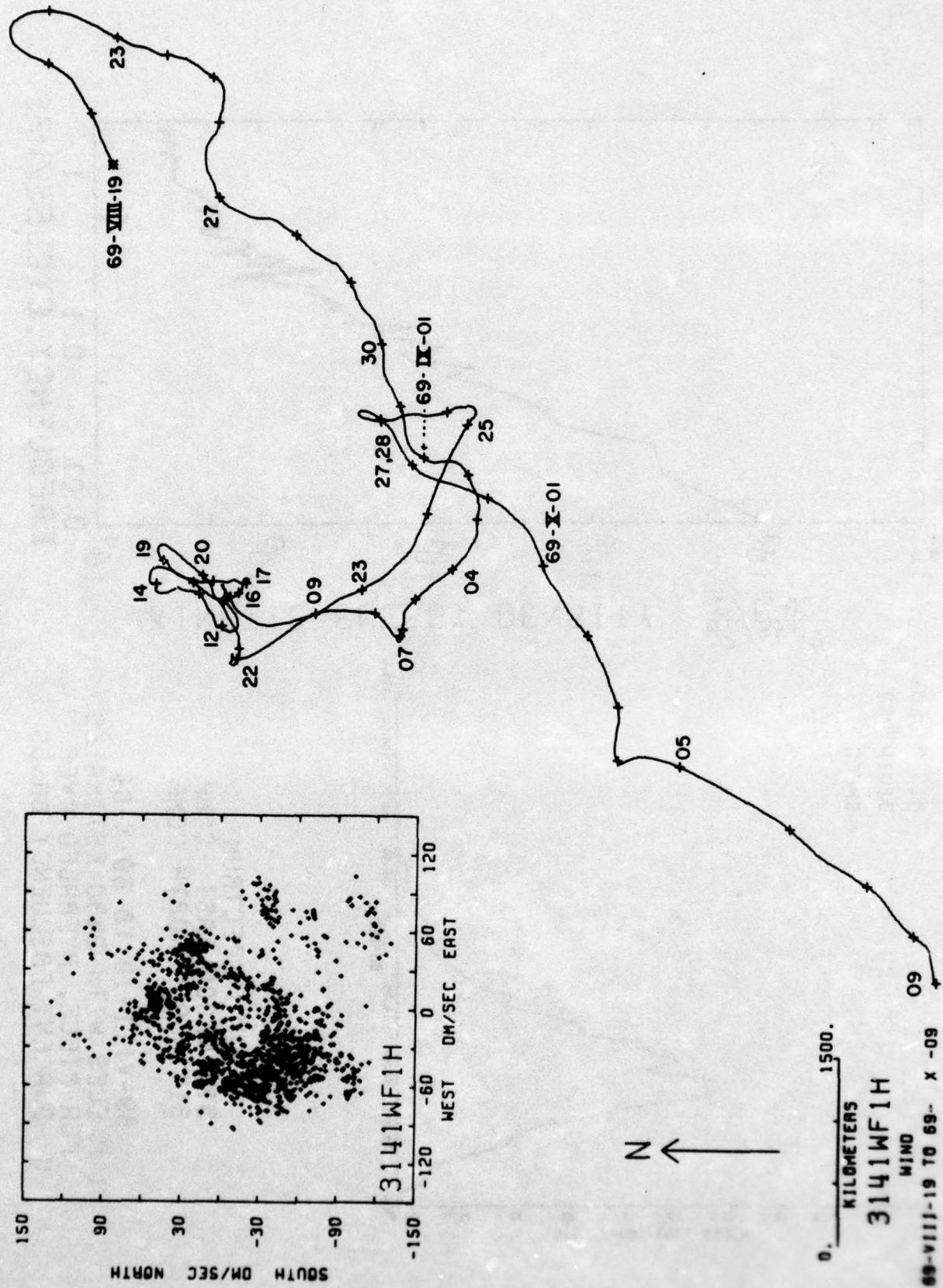
UNITS OF RAW DATA VARIABLES = DM/SEC

SAMPLE SIZE = 4960 POINTS

SPANNING RANGE
FROM 69-VIII-18 09.59.50
TO 69-X-09 01.44.50

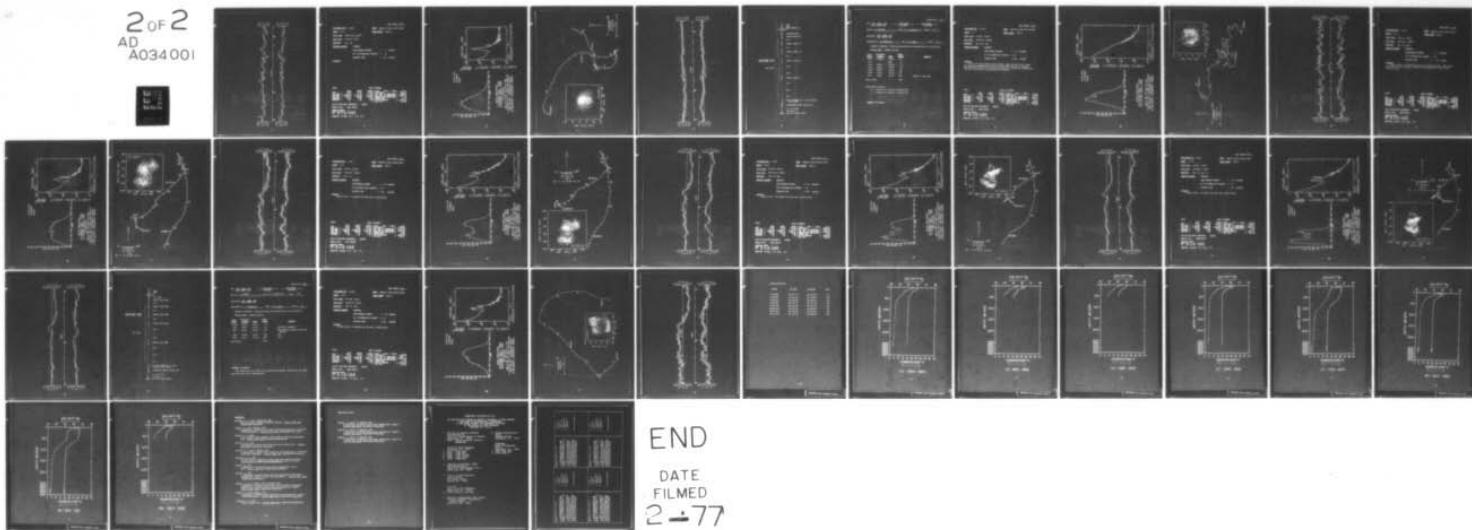
DURATION 51 DAYS 15 H 45 M 0 S





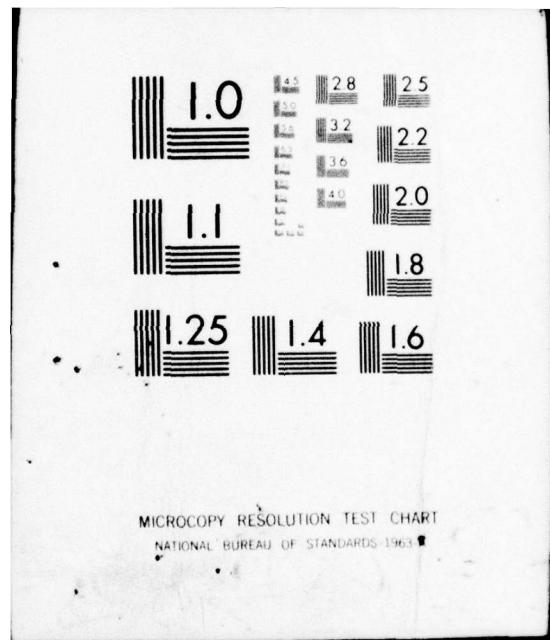
AD-A034 001 WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
A COMPILATION OF MOORED CURRENT DATA AND ASSOCIATED OCEANOGRAPH--ETC(U)
MAY 76 S A TARBELL F/G 8/3
UNCLASSIFIED WHOI-76-41 N00014-66-C-0241
NL

2 OF 2
AD
A034001

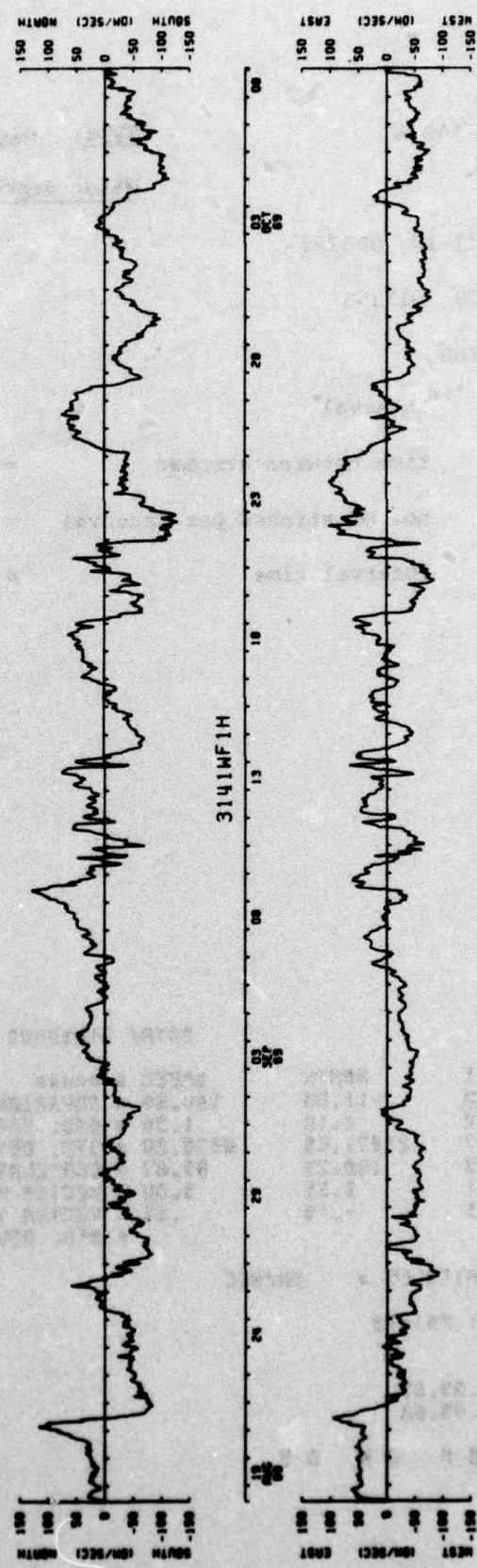


END

DATE
FILMED
2-77



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963



Data number 3143

Instrument No.: M-198

Type: Magnetic tape current meter

Depth: 14 m

Water depth: 5368 m

Start time: 69-VIII-18 095353

Stop time: 69-X-09 015353

Duration: 51d 16h

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

STATS

DATA/ 31430000

MEAN	EAST	NORTH	SPEED = 00000	EAST & NORTH	NNNN
STD. ERR.	55.89	-11.50	104.60 = COVARIANCE	= -2560.70	
VARIANCE	2.12	2.10	1.38 = STD. ERR. OF COVARIANCE	= 335.61	
STD. DEV.	22230.47	21871.48	8570.20 = STD. DEV. OF COVARIANCE	= 23630.45	
KURTOSIS	100.13	140.23	.97.07 = CORRELATION COEFFICIENT	= -.118	
SKENNESS	3.01	2.55	3.30 = VECTOR MEAN	= 57.18	
	-.01	-.18	.85 = VECTOR VARIANCE	= 22104.88	
			= STD. DEV.	= 140.60	

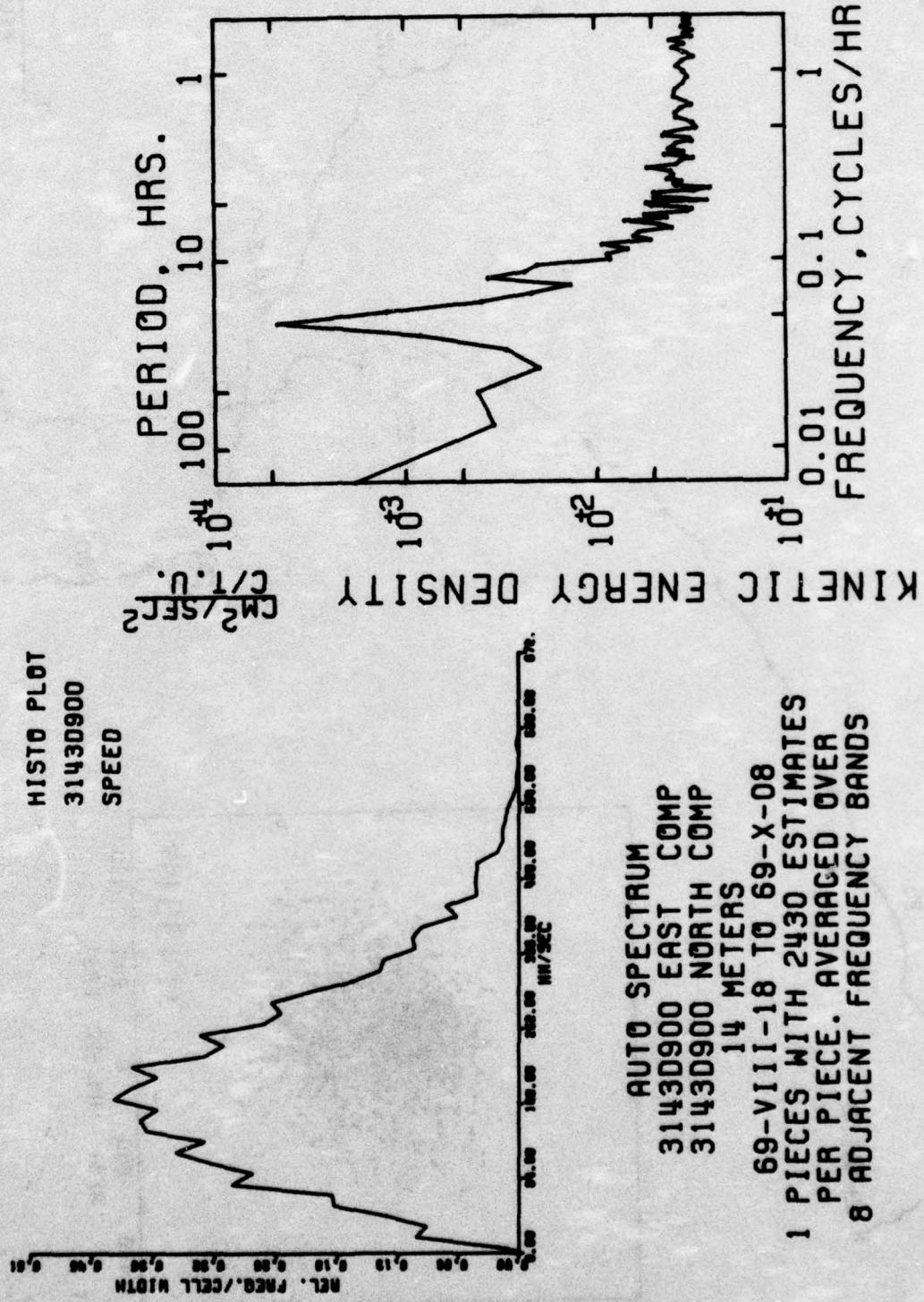
UNITS OF RAW DATA VARIABLES = MM/SEC

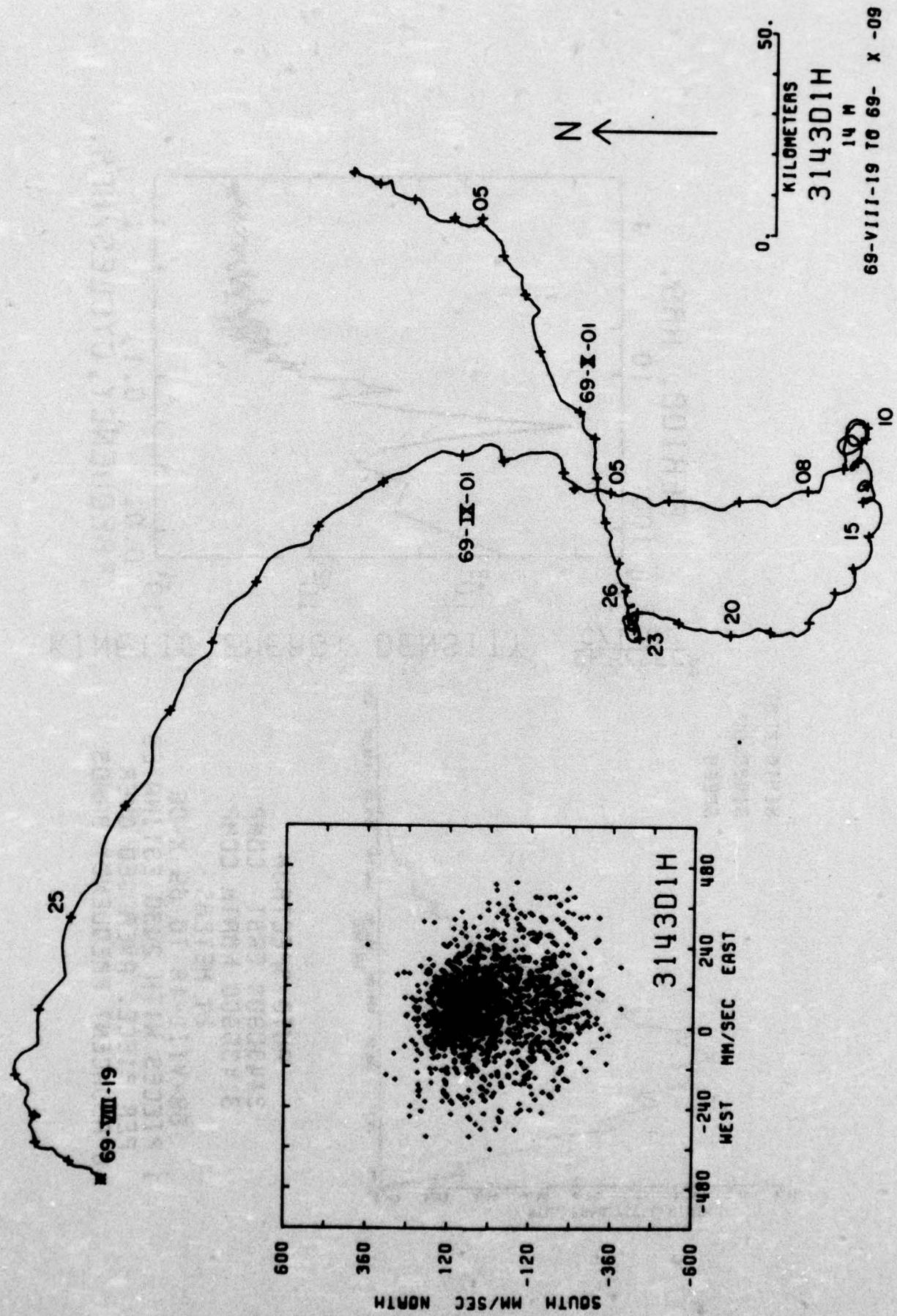
SAMPLE SIZE = 4861 POINTS

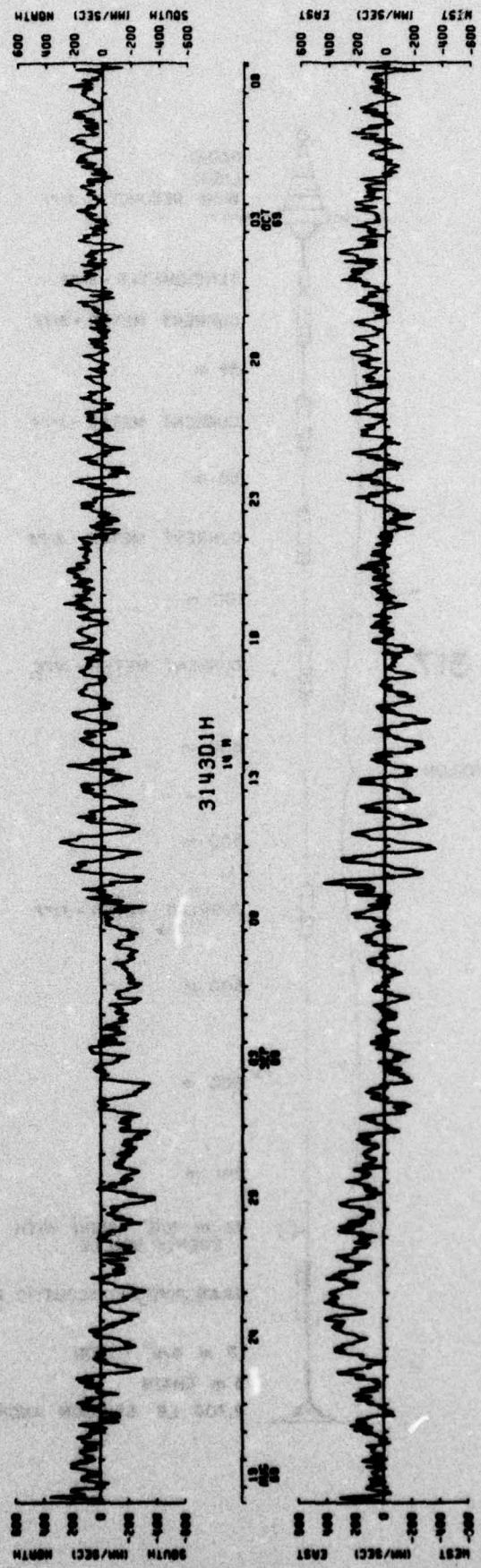
SPANNING RANGE

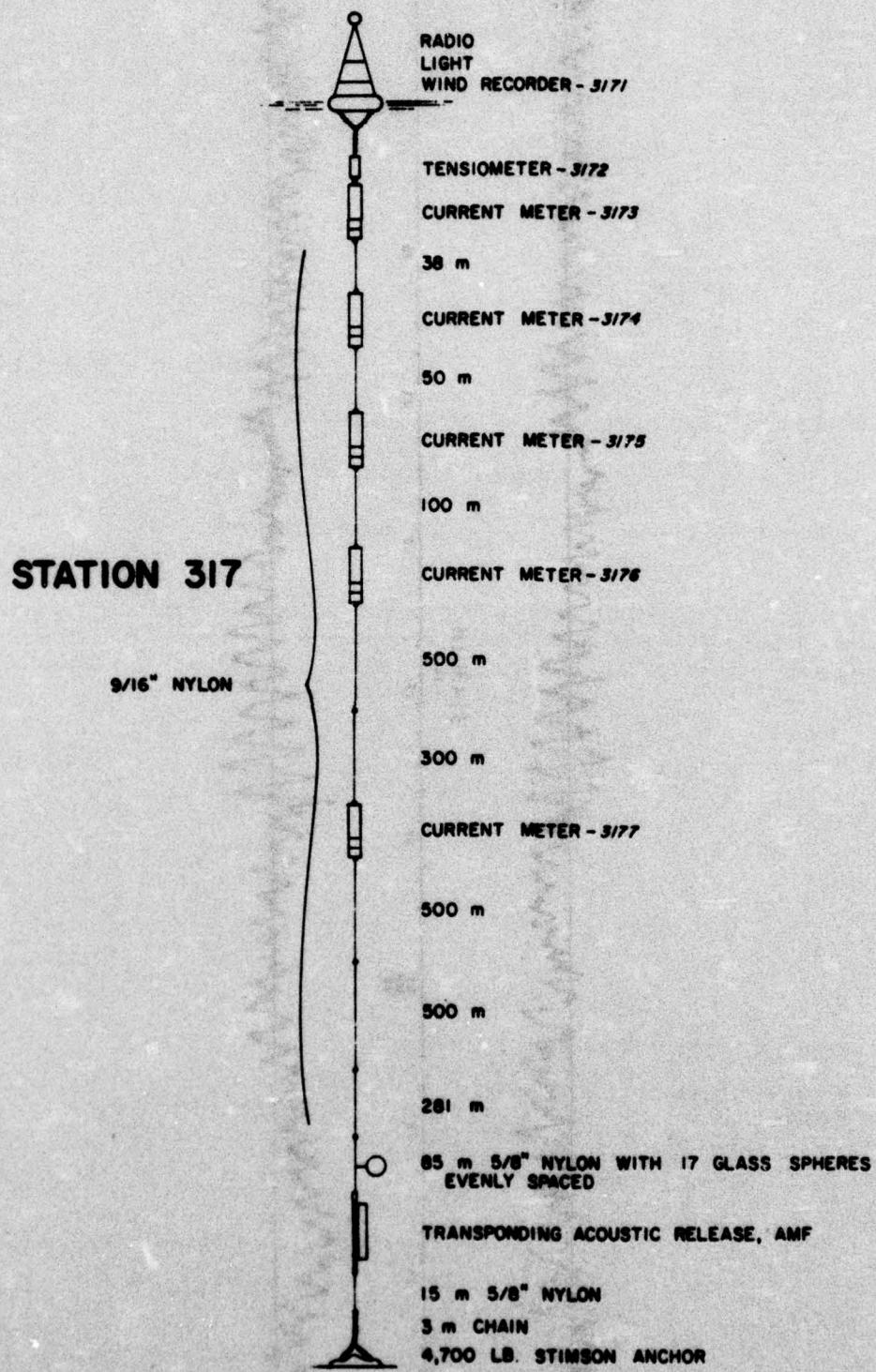
FROM 69-VIII-18 095353
TO 69-X-09 015353

DURATION 51 DAYS 16 H 0 M 0 S









Mooring No. 317

Set 69 Oct 06 39° 12.0N 70° 02.8W
Year Month Day Latitude Longitude

Set by J. Gifford Ship R. V. Atlantis II Cruise 53

Retrieved 70 Jan 05
Year Month Day

Retrieved by R. Heinmiller Ship R. V. Chain Cruise 97

Purpose of Mooring: Horizontal mooring array with moorings no. 318 and 310.

Mooring Type: Surface mooring.

<u>Data Number</u>	<u>Instrument Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3171*	M-101X	M.W.R.	-0-	
3172		Temp	11	
3173*	M-122	M.C.M.	13	
3174*	M-212	M.C.M.	53	
3175*	M-213	M.C.M.	105	
3176*	M-203	M.C.M.	207	
3177	M-129	M.C.M.	1000	Unable to read tape

Water depth 2681

Hydrographic Stations

R. V. Atlantis II cruise 53 Station 1550

R. V. Atlantis II cruise 53 Station 1552

COMMENTS ON MOORING:

Data number 3171

Instrument No.: W-101X

Type: Magnetic tape wind recorder

Depth: -0-

Water depth: 2681 m

Start time: 69-X-06 145330

Stop time: 69-XII-01 050830

Duration: 55d 14h 15m

Sampling scheme: Interval

time between strobes = 5.27 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

One of the first digital clock records. Near the end of the record the data gets progressively worse then dies before the end of the tape. Wind direction follows ocean current conventions to facilitate comparisons; add 180° to direction for meteorological readings.

STATS

DATA/ 3171NJ800

	EAST	NORTH	SPEED = $\sqrt{E^2 + N^2}$	EAST & NORTH	ANGLE
MEAN	18.14	-13.41	80.27 = COVARIANCE	-	251.68
STD. ERR.	.86	.72	.38 = STD. ERR. OF COVARIANCE	-	43.74
VARIANCE	3841.71	2790.88	774.84 = STD. DEV. OF COVARIANCE	-	3185.77
STD. DEV.	62.78	52.28	27.04 = CORRELATION COEFFICIENT	-	.077
KURTOSIS	1.85	2.40	2.87 = VECTOR MEAN	-	23.97
SKENNESS	-.15	.18	.24 = VECTOR VARIANCE	-	3338.30
			= STD. DEV.	-	57.76

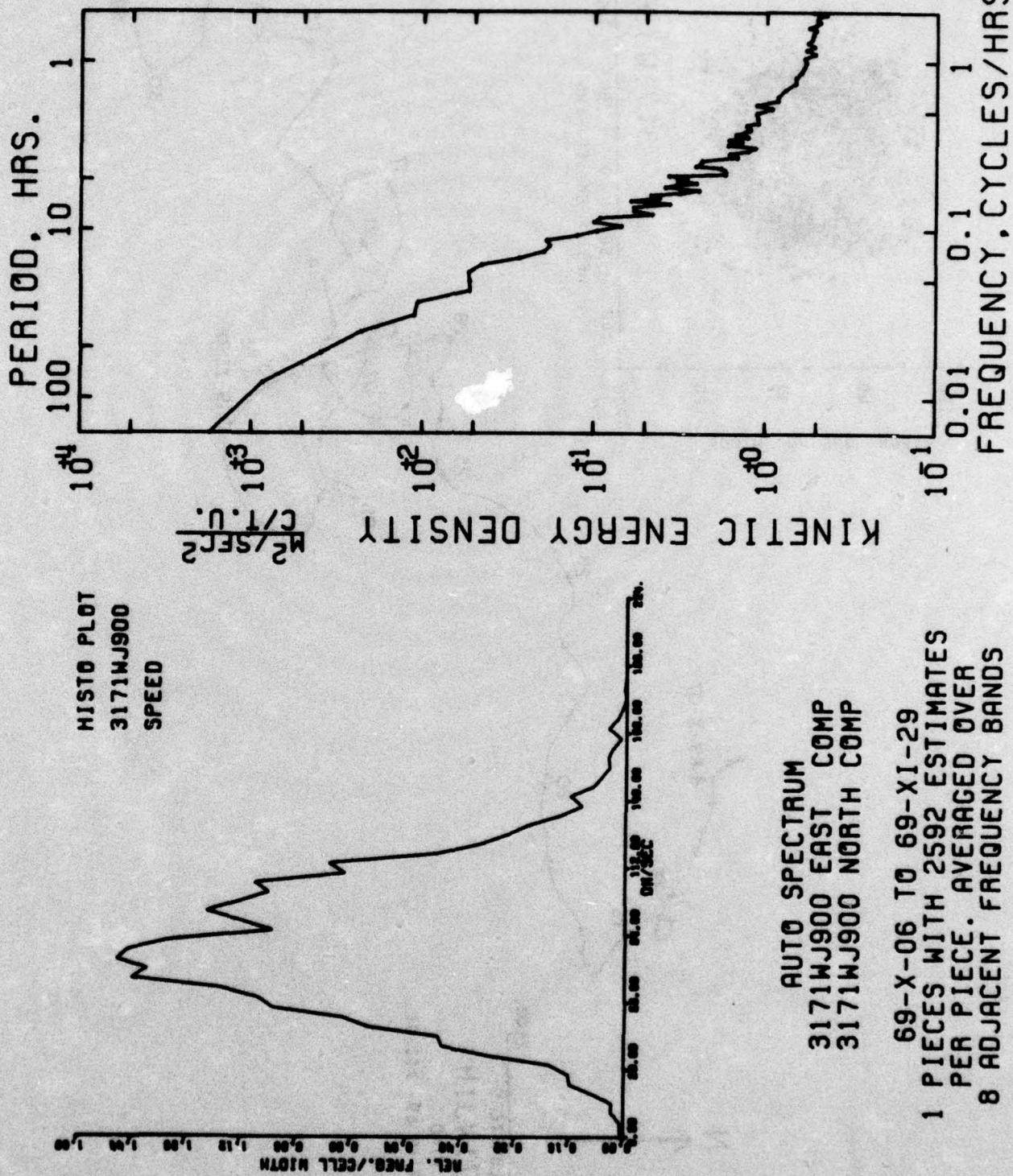
UNITS OF RAW DATA VARIABLES = NM/SEC

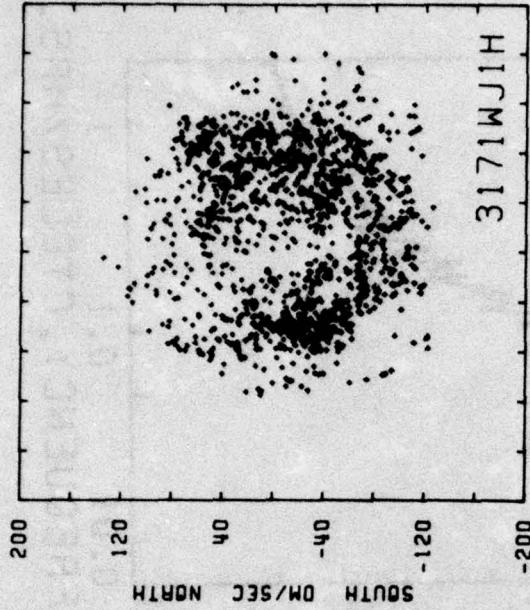
SAMPLE SIZE = 5330 POINTS

SPANNING RANGE

FROM 69-X-06 14.53.30
TO 69-XII-01 05.08.30

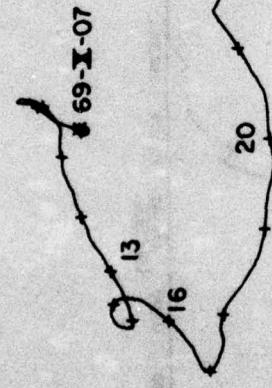
DURATION 55 DAYS 14 H 15 M 0 S



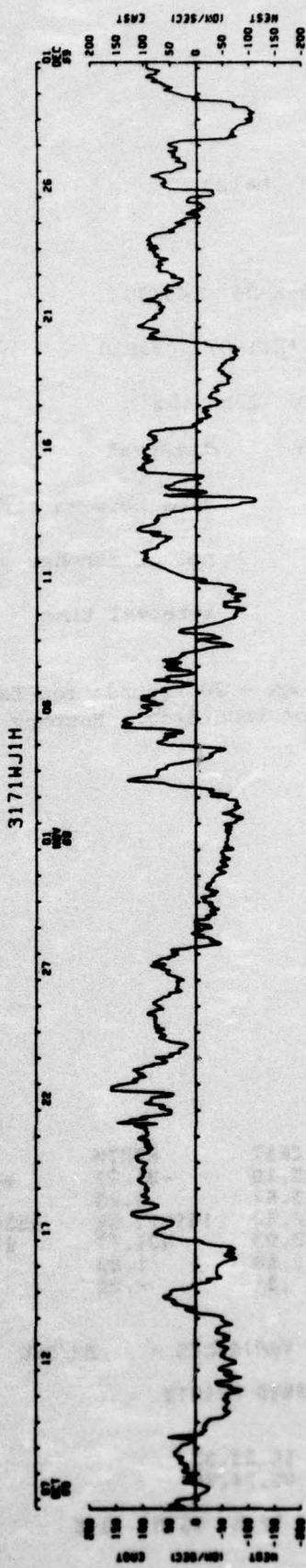
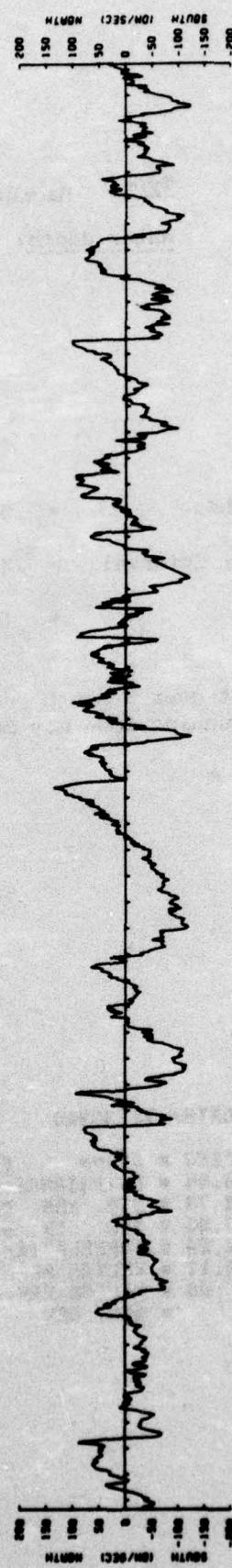


3171WJ1H
-160 -80 0 80 160
WEST DM/SEC EAST

200
120
40
-40
-120
SOUTH DM/SEC NORTH



N
KILOMETERS
0. 2500.
3171WJ1H
WIND
69- X-07 10 69- XII-01



Data number 3173

Instrument No.: M-122

Type: Magnetic tape current meter

Depth: 13 m

Water depth: 2681 m

Start time: 69-X-06 145330

Stop time: 69-XII-07 033830

Duration: 61d 12h 45m

Sampling scheme: Interval

time between strobes = 5.27 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

Digital clock - 20 seconds too fast over 3 month period. Good record until near end of recording. Battery running down may be cause of bad records at end.

STATS

	EAST	NORTH
MEAN	43.10	-31.22
STD. ERR.	3.67	5.23
VARIANCE	70542.00	181417.00
STD. DEV.	202.03	401.77
KURTOSIS	2.80	1.93
SKEWNESS	.91	-.28

DATA/ 31730800

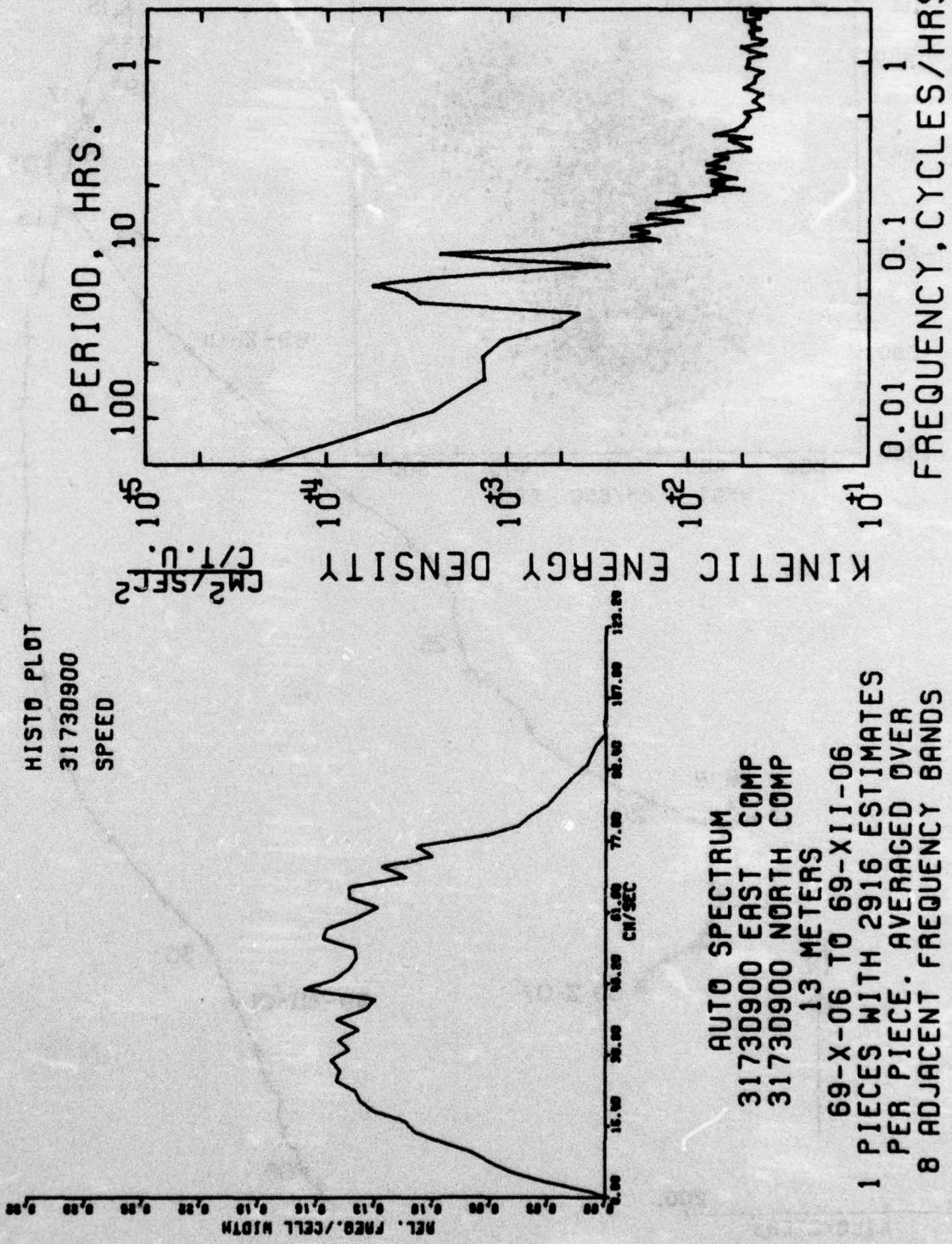
	EAST	NORTH	SPEED	EAST & NORTH	MEAN
MEAN	43.10	-31.22	444.94	= COVARIANCE	42038.00
STD. ERR.	3.67	5.23	2.70	= STD. ERR. OF COVARIANCE	1425.65
VARIANCE	70542.00	181417.00	45807.03	= STD. DEV. OF COVARIANCE	108580.35
STD. DEV.	202.03	401.77	214.26	= CORRELATION COEFFICIENT	.378
KURTOSIS	2.80	1.93	2.11	= VECTOR MEAN	59.22
SKEWNESS	.91	-.28	.08	= VECTOR VARIANCE	120480.35
				= STD. DEV.	947.10

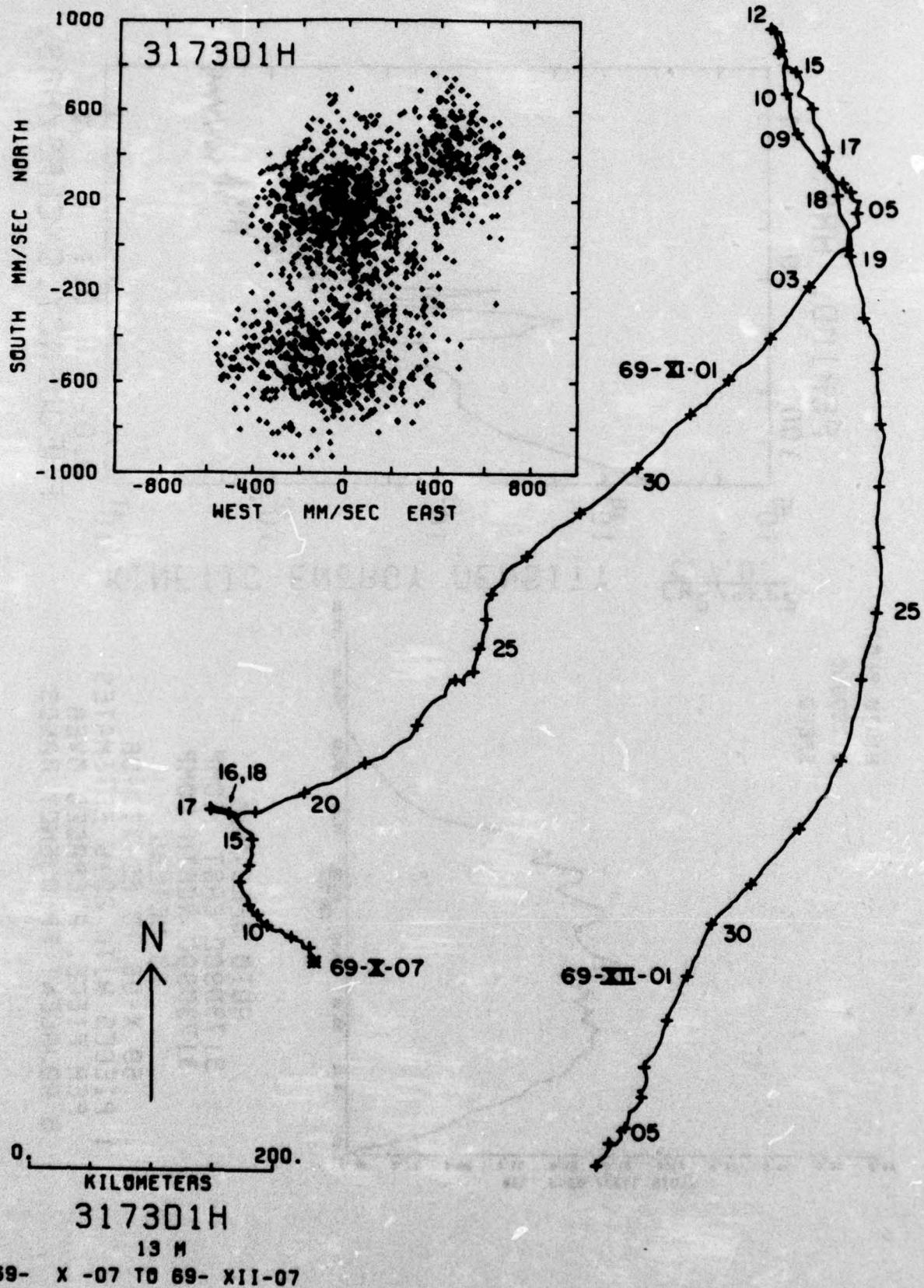
UNITS OF RAW DATA VARIABLES = MM/SEC

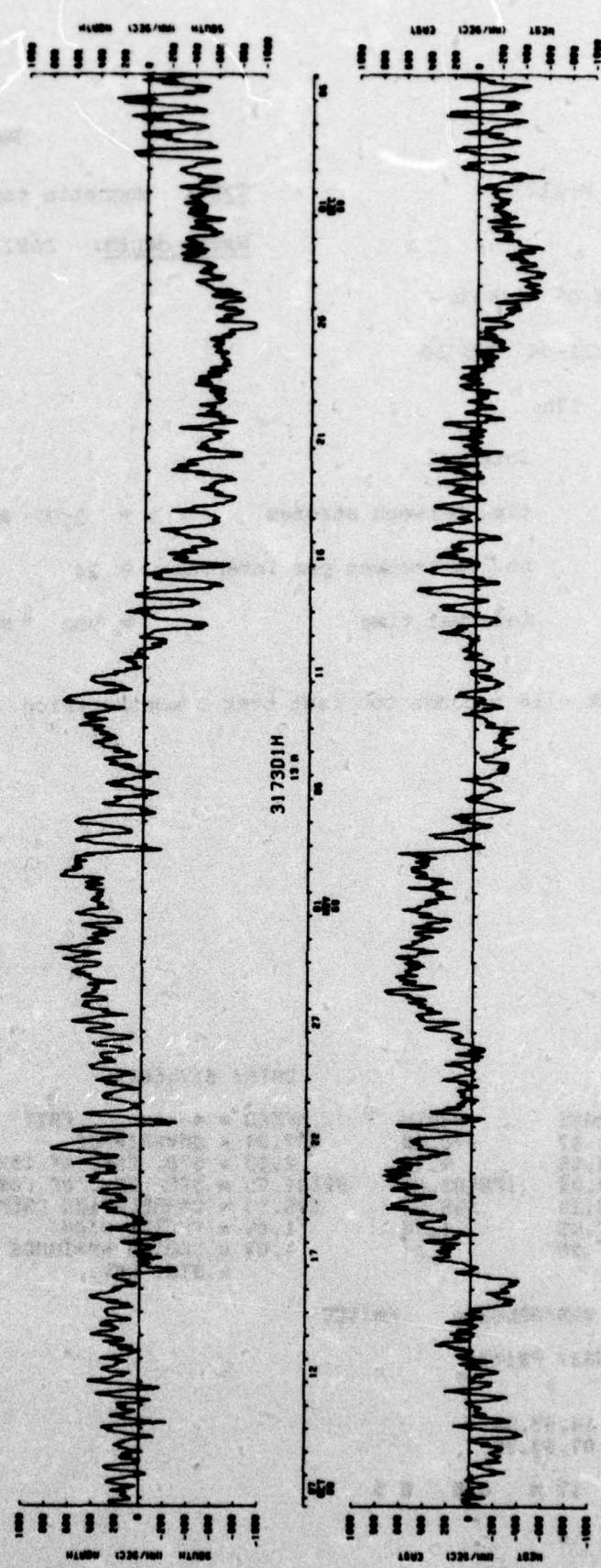
SAMPLE SIZE = 5808 POINTS

SPANNING RANGE
FROM 69-X-06 14:53:30
TO 69-XII-07 03:38:30

DURATION 61 DAYS 12 H 45 M 0 S







Data number 3174

Instrument No.: M-212

Type: Magnetic tape current meter

Depth: 53 m

Water depth: 2681 m

Start time: 69-X-06 145330

Stop time: 69-XII-04 075330

Duration: 58d 17h

Sampling scheme: Interval

time between strobes = 5.27 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

Digital clock - 16 seconds too fast over 3 month period.

STATS

MEAN	EAST	NORTH
-	46.87	-78.43
STD. ERR.	2.45	4.78
VARIANCE	67265.66	120465.60
STD. DEV.	256.24	358.00
KURTOSIS	2.43	1.76
SKEWNESS	.38	-.31

DATA/ 3174E300

SPEED	= MEAN EAST & NORTH	= 00000
407.84	= COVARIANCE	= 41700.00
2.60	= STD. ERR. OF COVARIANCE	= 1107.00
30141.53	= STD. DEV. OF COVARIANCE	= 03140.29
100.30	= CORRELATION COEFFICIENT	= .447
1.84	= VECTOR MEAN	= 00.03
-.07	= VECTOR VARIANCE	= 00350.72
	= STD. DEV.	= 313.61

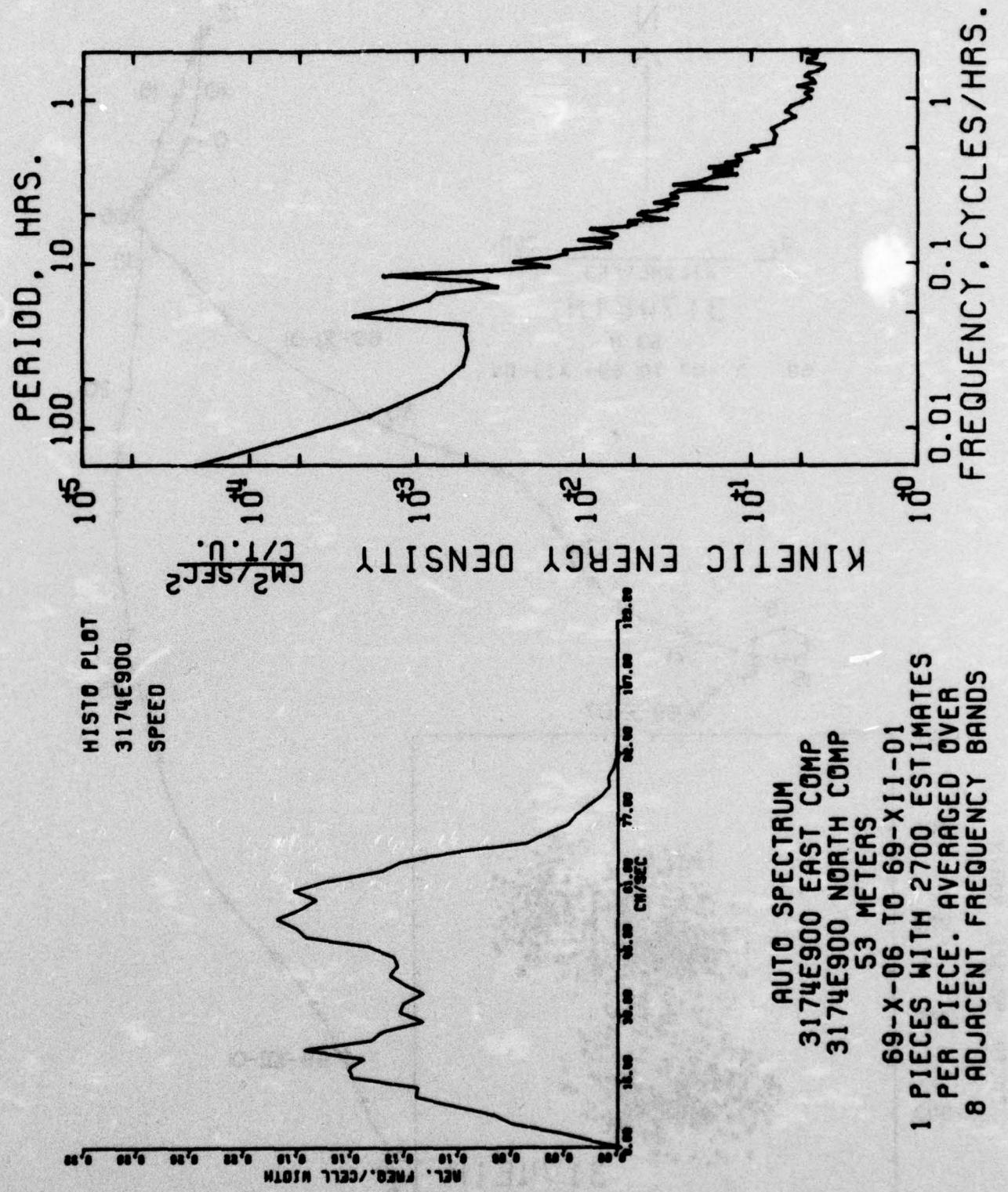
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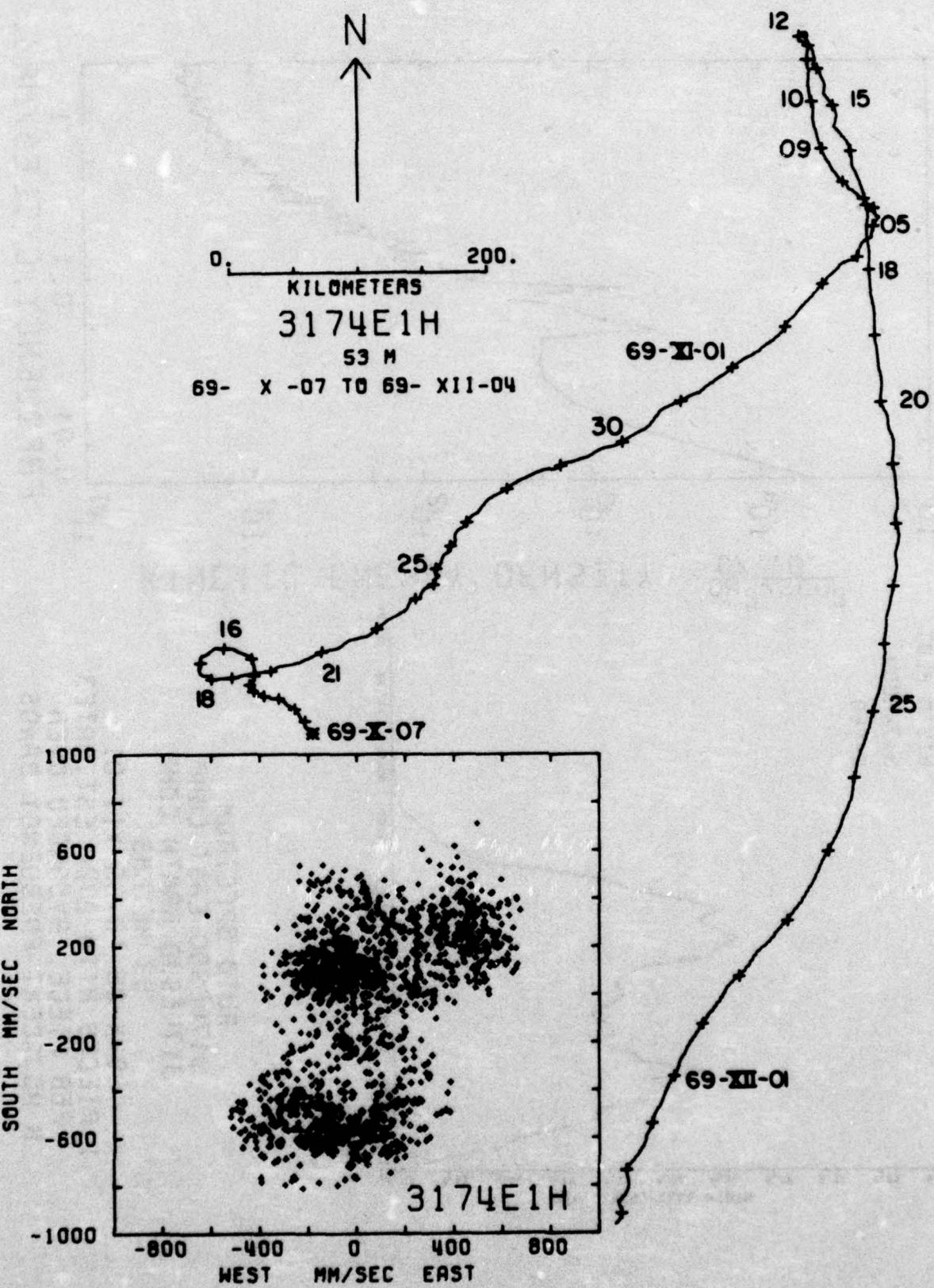
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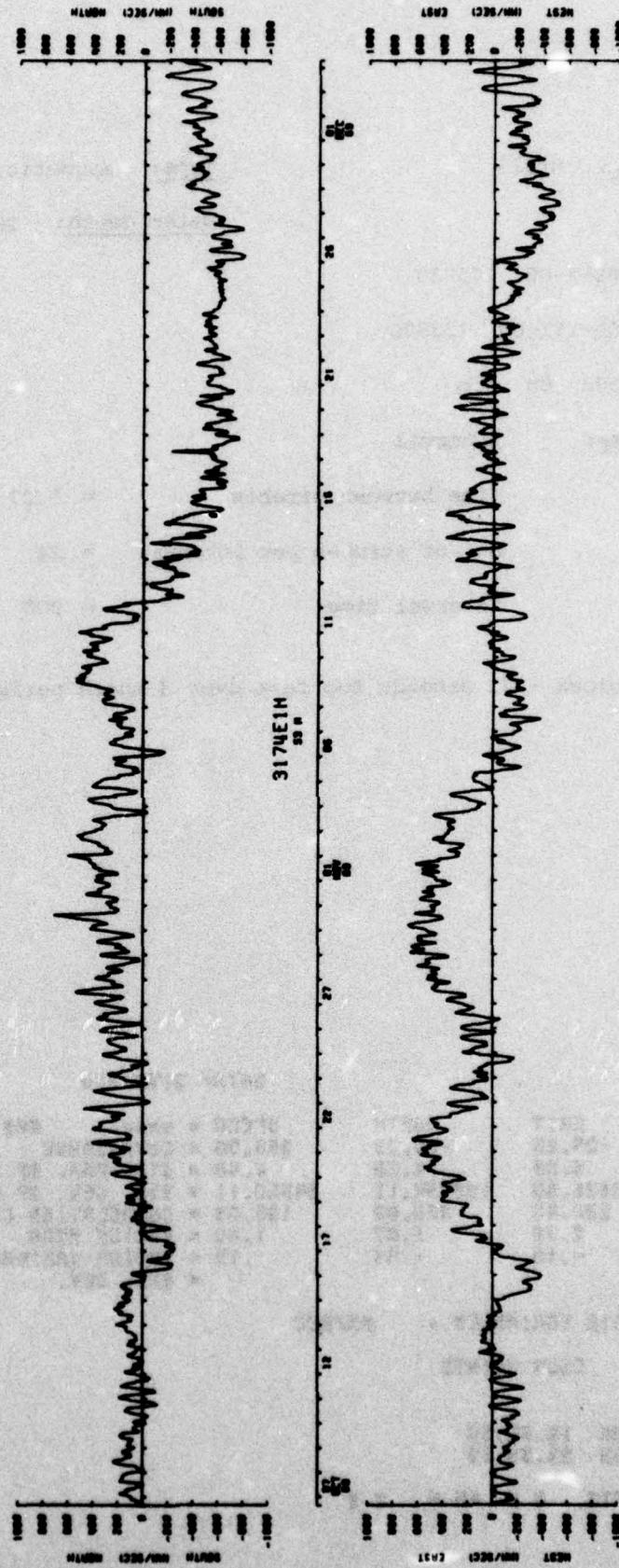
SPANNING RANGE

FROM 69-X-06 14:53:30
TO 69-XII-04 07:53:30

DURATION 58 DAYS 17 H 0 M 0 S







Data number 3175

Instrument No.: M-213

Type: Magnetic tape current meter

Depth: 105 m

Water depth: 2681 m

Start time: 69-X-06 145330

Stop time: 69-XII-03 233830

Duration: 58d 8h 45m

Sampling scheme: Interval

time between strobes = 5.27 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

Digital clock - 23 seconds too fast over 3 month period.

STATS

MEAN	-25.25	NORTH
STD. ERR.	3.06	4.20
VARIANCE	52626.60	103034.11
STD. DEV.	220.40	320.00
KURTOSIS	2.78	1.87
SKEWNESS	-.18	-.33

DATA/ 3175A800

SPEED # 00000	EAST & NORTH	00000
550.00 # COVARIANCE		30846.60
2.40 # STD. ERR. OF COVARIANCE		875.00
34550.11 # STD. DEV. OF COVARIANCE		65560.20
1.00 # CORRELATION COEFFICIENT		.418
1.00 # VECTOR MEAN		04.26
.13 # VECTOR VARIANCE		77890.95
# STD. DEV.		278.00

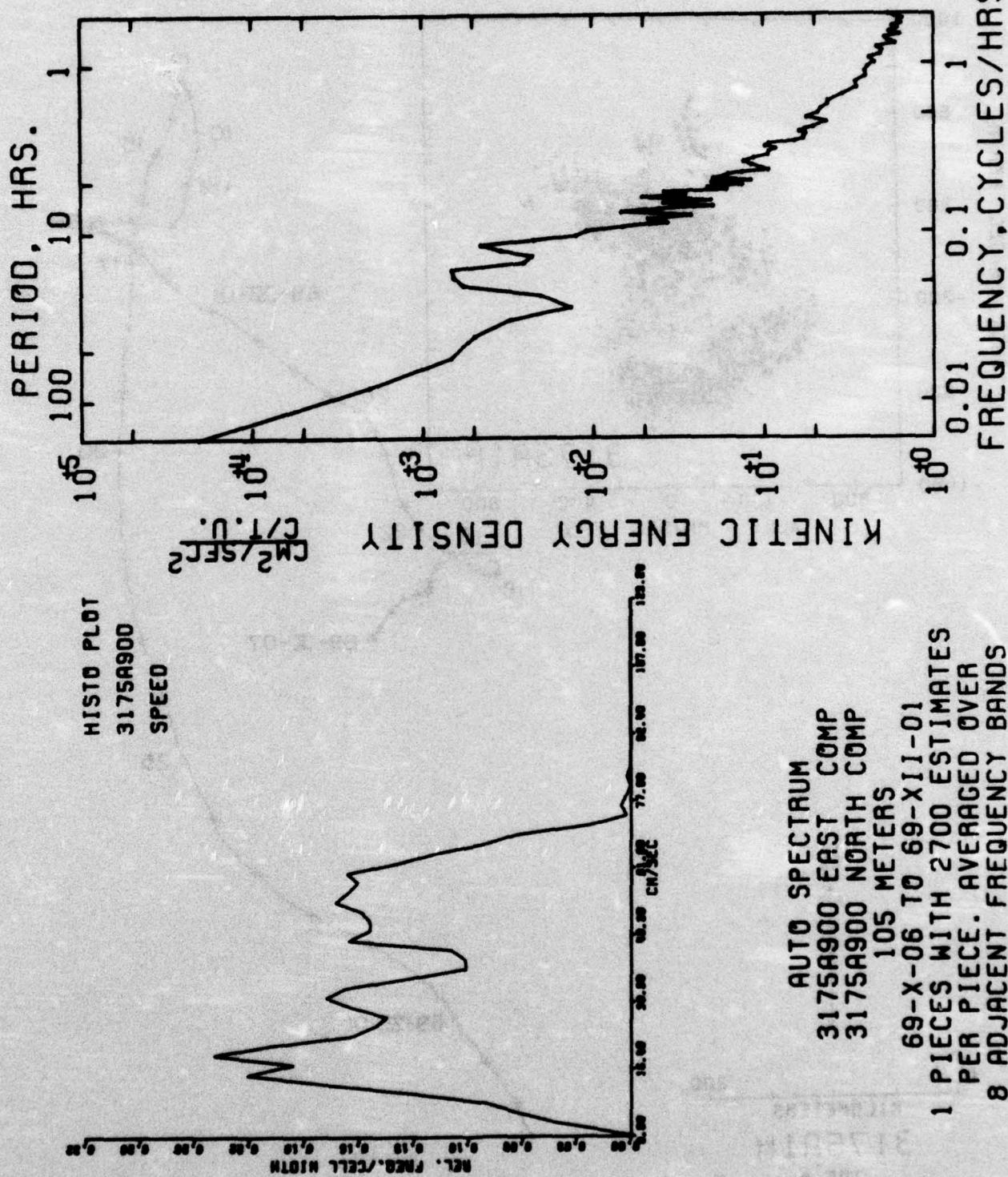
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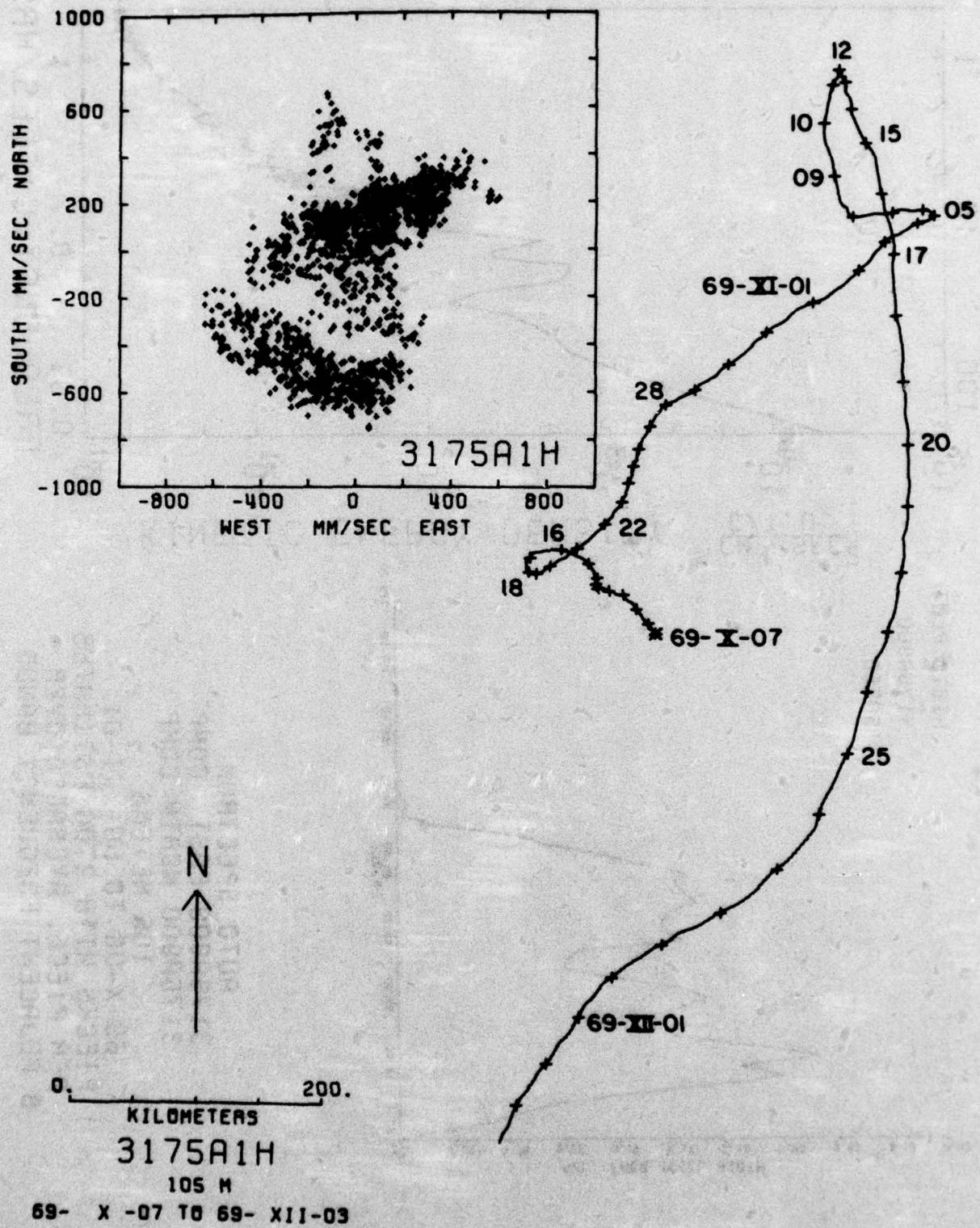
SAMPLE SIZE = 5604 POINTS

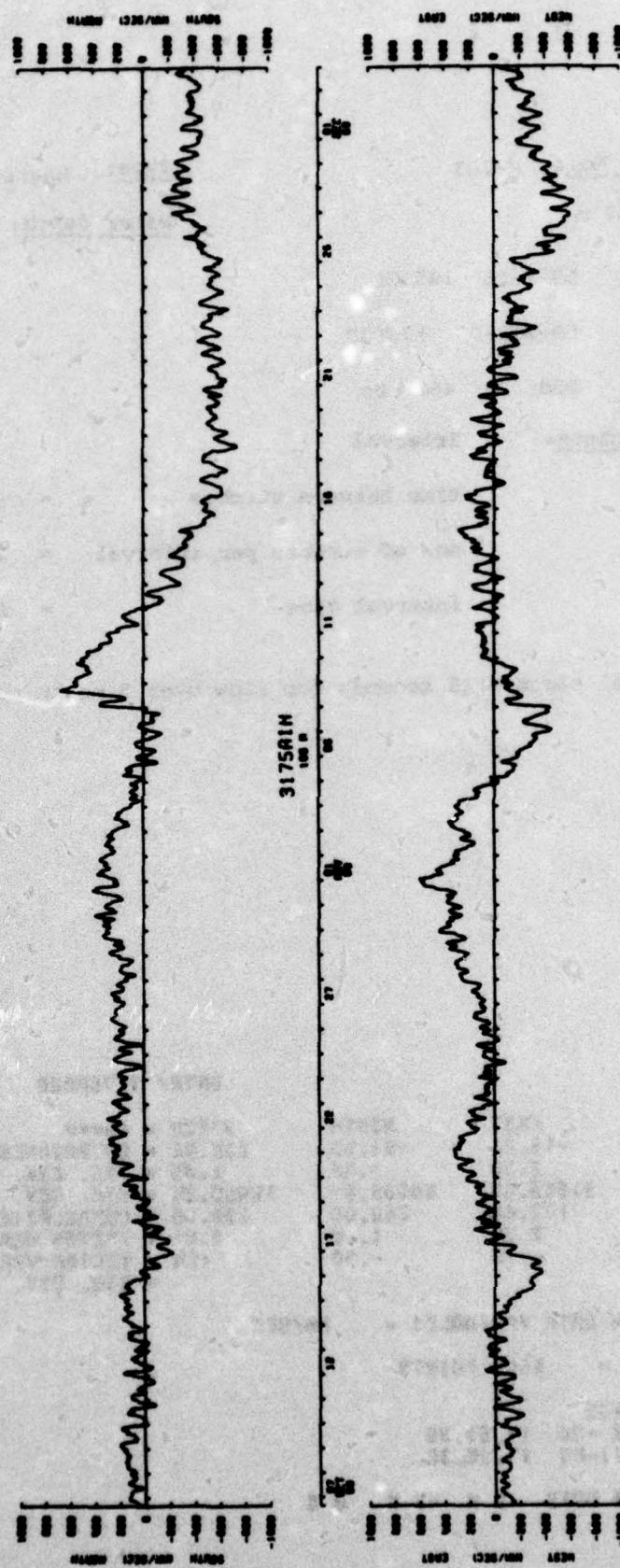
SPANNING RANGE

FROM 69-X-06 14.53.30
TO 69-XII-03 23.30.30

DURATION 58 DAYS 8 H 45 M 0 S







Data number 3176

Instrument No.: M-203

Type: Magnetic tape current meter

Depth: 207 m

Water depth: 2681 m

Start time: 69-X-06 145330

Stop time: 69-XII-03 173830

Duration: 58d 2h 45m 0s

Sampling scheme: Interval

time between strobes = 5.27 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

Digital clock - 15 seconds too slow over 3 month period.

STATS

	EAST	NORTH
MEAN	-13.21	-64.43
STD. ERR.	2.38	3.45
VARIANCE	31668.48	66585.67
STD. DEV.	177.86	250.06
KURTOSIS	2.30	1.92
SKWNESS	-.15	-.30

DATA/ 3176R900

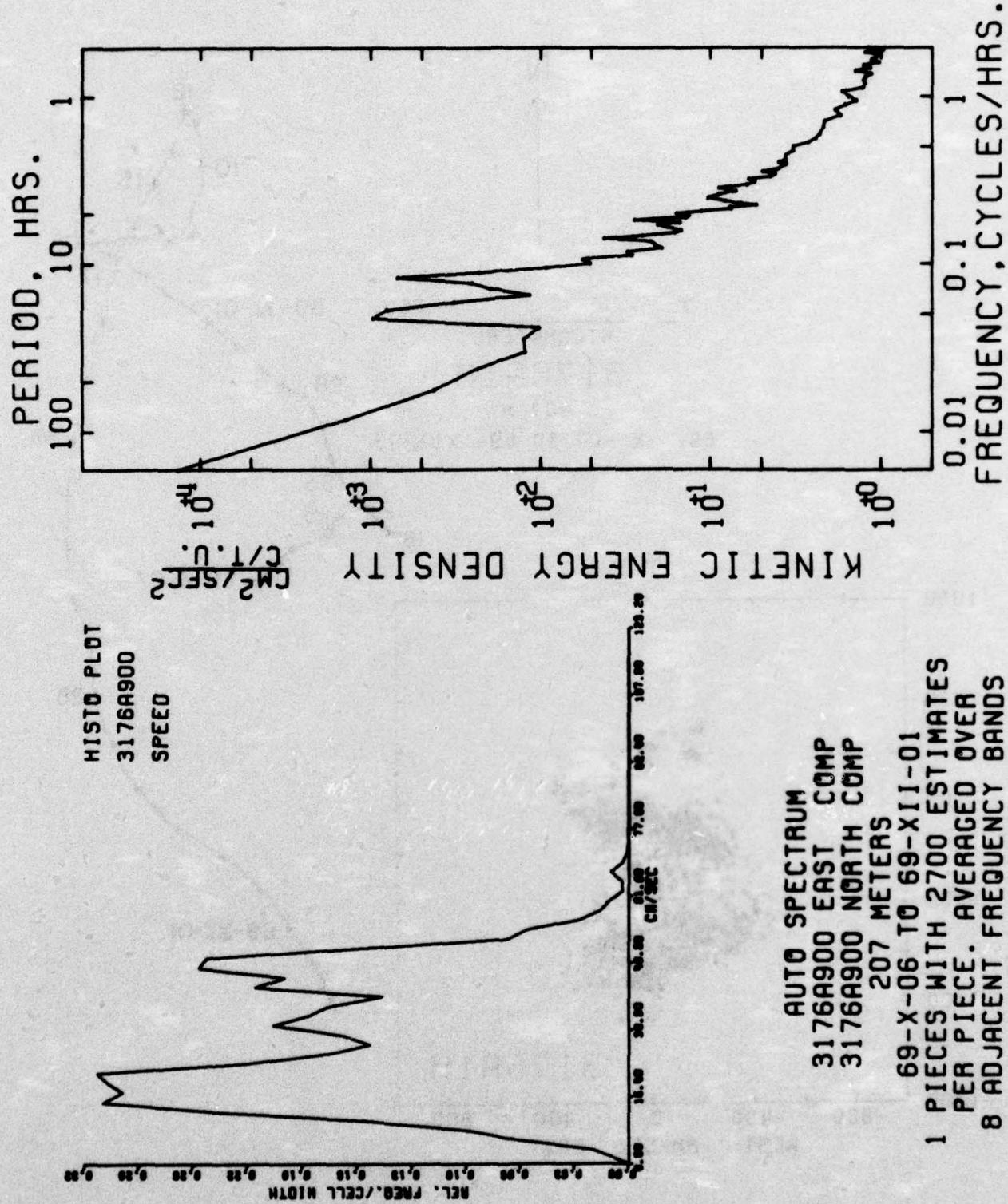
SPEED	= MEAN	EAST & NORTH	= MEAN
209.02	= COVARIANCE	= 10724.52	
1.05	= STD. ERR. OF COVARIANCE	= 587.21	
18080.24	= STD. DEV. OF COVARIANCE	= 43084.51	
.190.06	= CORRELATION COEFFICIENT	= .294	
2.01	= VECTOR MEAN	= 65.77	
.24	= VECTOR VARIANCE	= 48132.18	
	= STD. DEV.	= 221.66	

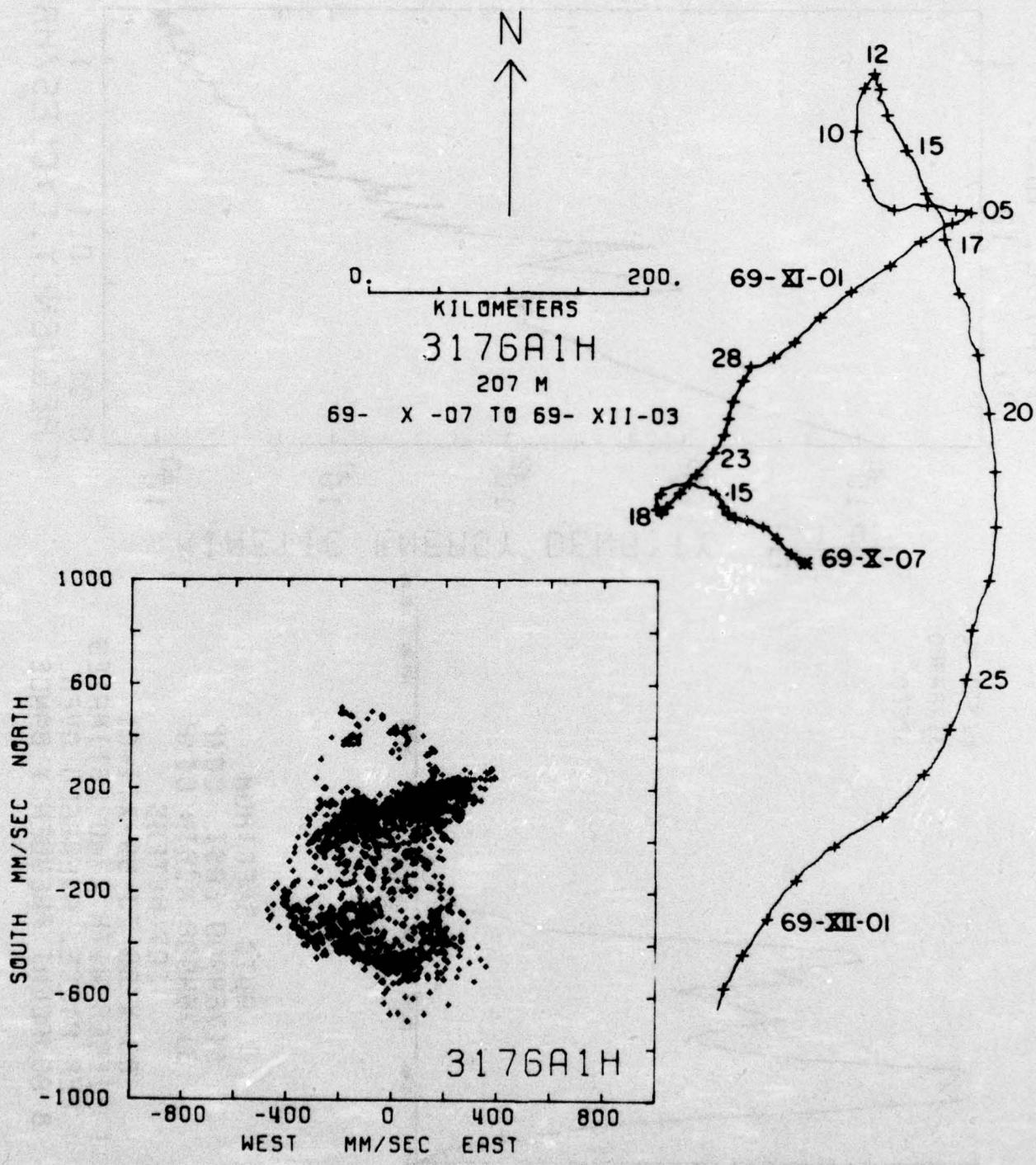
UNITS OF RAW DATA VARIABLES = MM/SEC

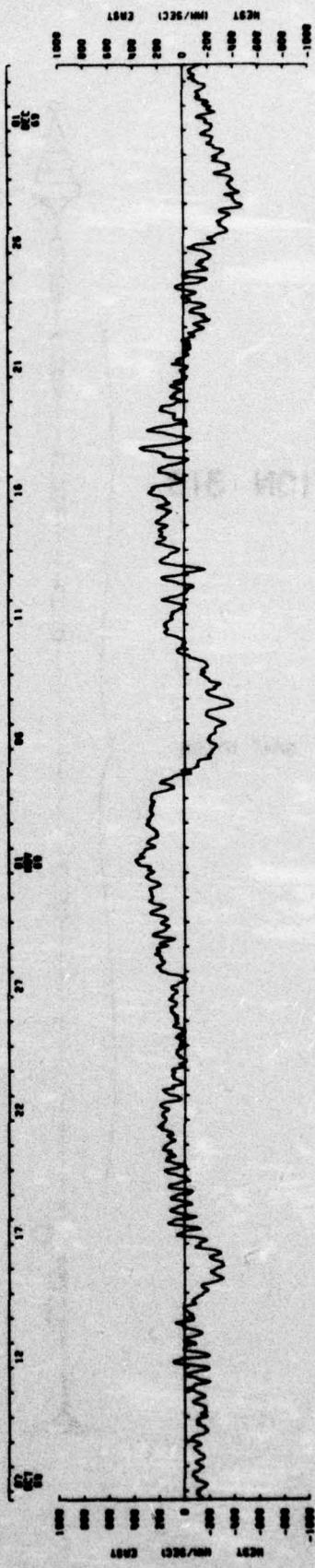
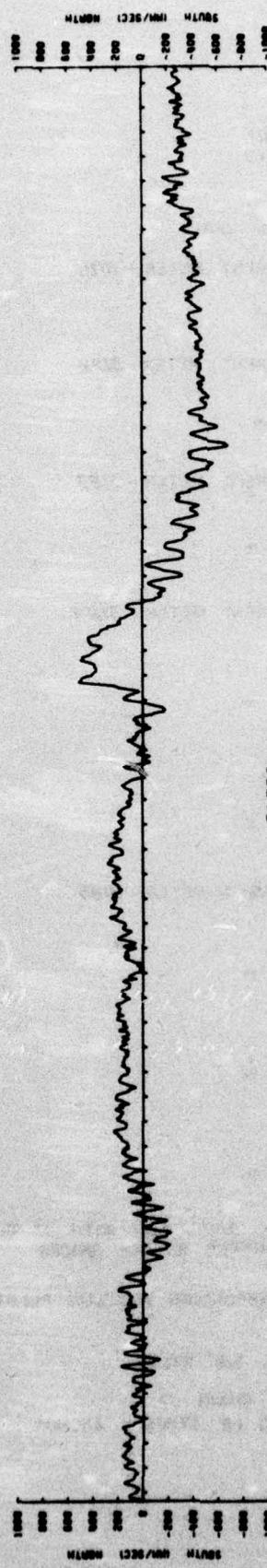
SAMPLE SIZE = 5500 POINTS

SPANNING RANGE
FROM 69-X-06 14:53:30
TO 69-XII-03 17:38:30

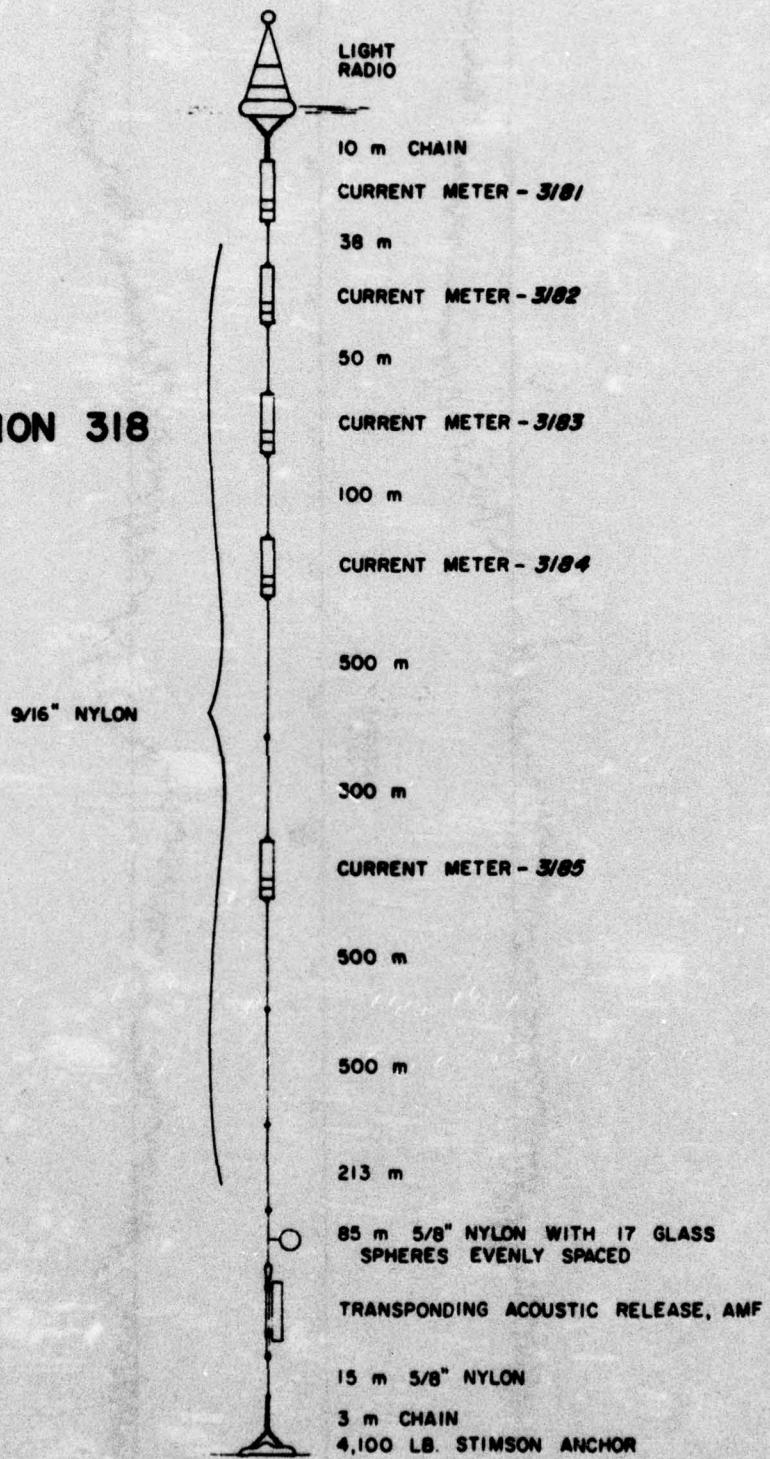
DURATION 58 DAYS 2 H 45 M 0 S







STATION 318



Mooring No. 318

Set 69 Oct 06 39° 19.7N 70° 02.8W
Year Month Day Latitude Longitude

Set by J. Gifford Ship R. V. Atlantis II Cruise 53

Retrieved 70 Jan 06
Year Month Day

Retrieved by R. Heinmiller Ship R. V. Chain Cruise 97

Purpose of Mooring: Horizontal array with station 317 and 310 at Site D.

Mooring Type: Surface mooring.

Data Number	Instrument Number	Type	Depth Meters	Comments
3181*	M-209	M.C.M.	12	
3182	M-205	M.C.M.	52	Electronic problems
3183	M-127	M.C.M.	104	Tape advance problems, also vane missing
3184	M-196	M.C.M.	206	Lost
3185	M-214	M.C.M.	1008	Lost
Water depth			2545	

COMMENTS ON MOORING:

The release did not release so the mooring was hauled. The mooring line broke below the first three current meters.

Data number 3181

Instrument No.: M-209

Type: Magnetic tape current meter

Depth: 12 m

Water depth: 2545 m

Start time: 69-X-06 182330

Stop time: 69-XII-04 015330

Duration: 58d 7h 30m

Sampling scheme: Interval

time between strobes = 5.27 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

Digital clock - 8 seconds too slow over 3 month period.

STATS

	EAST	NORTH
MEAN	160.13	22.78
STD. ERR.	4.78	6.34
VARIANCE	128827.28	225000.33
STD. DEV.	355.65	474.34
KURTOSIS	1.08	1.78
SKENNESS	-.15	-.41

DATA/ 3181R800

SPEED	=	MEAN	EAST & NORTH	=	MEAN
584.32	=	COVARIANCE		=	33862.34
2.55	=	STD. ERR. OF COVARIANCE		=	2211.11
38387.11	=	STD. DEV. OF COVARIANCE		=	189440.55
188.88	=	CORRELATION COEFFICIENT		=	.201
2.58	=	VECTOR MEAN		=	181.78
-.28	=	VECTOR VARIANCE		=	175819.80
	=	STD. DEV.		=	418.38

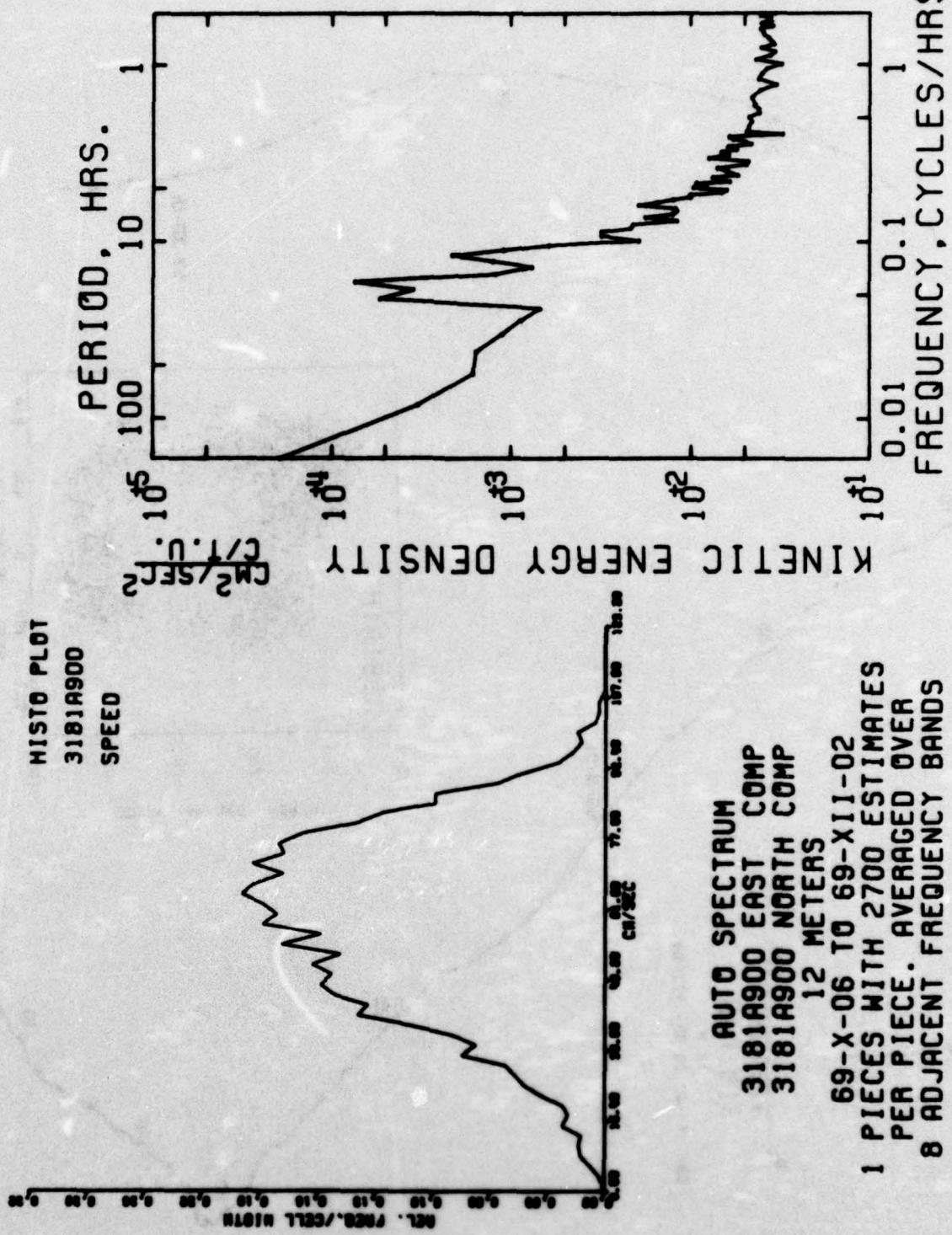
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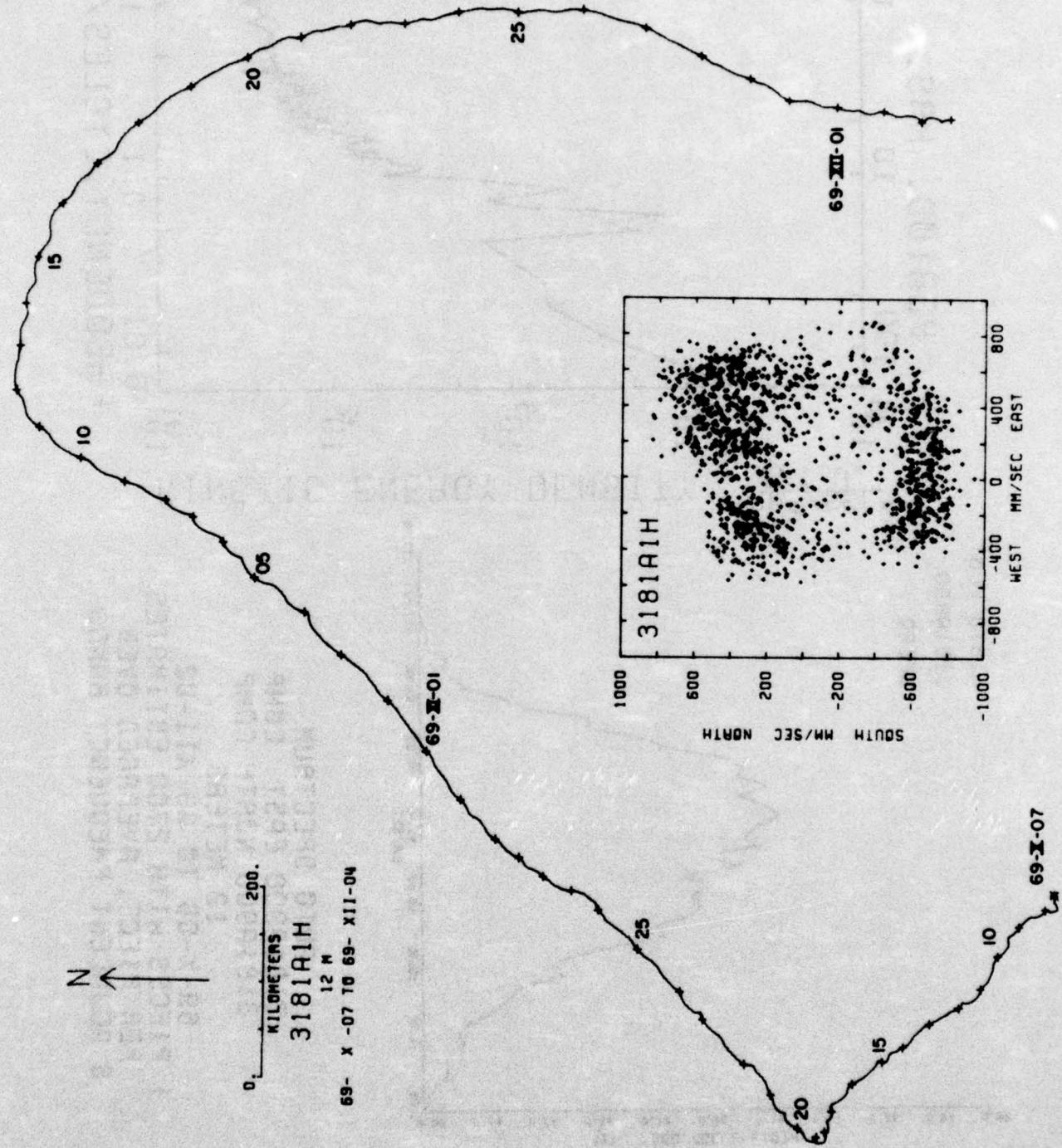
SAMPLE SIZE = 5500 POINTS

SPANNING RANGE

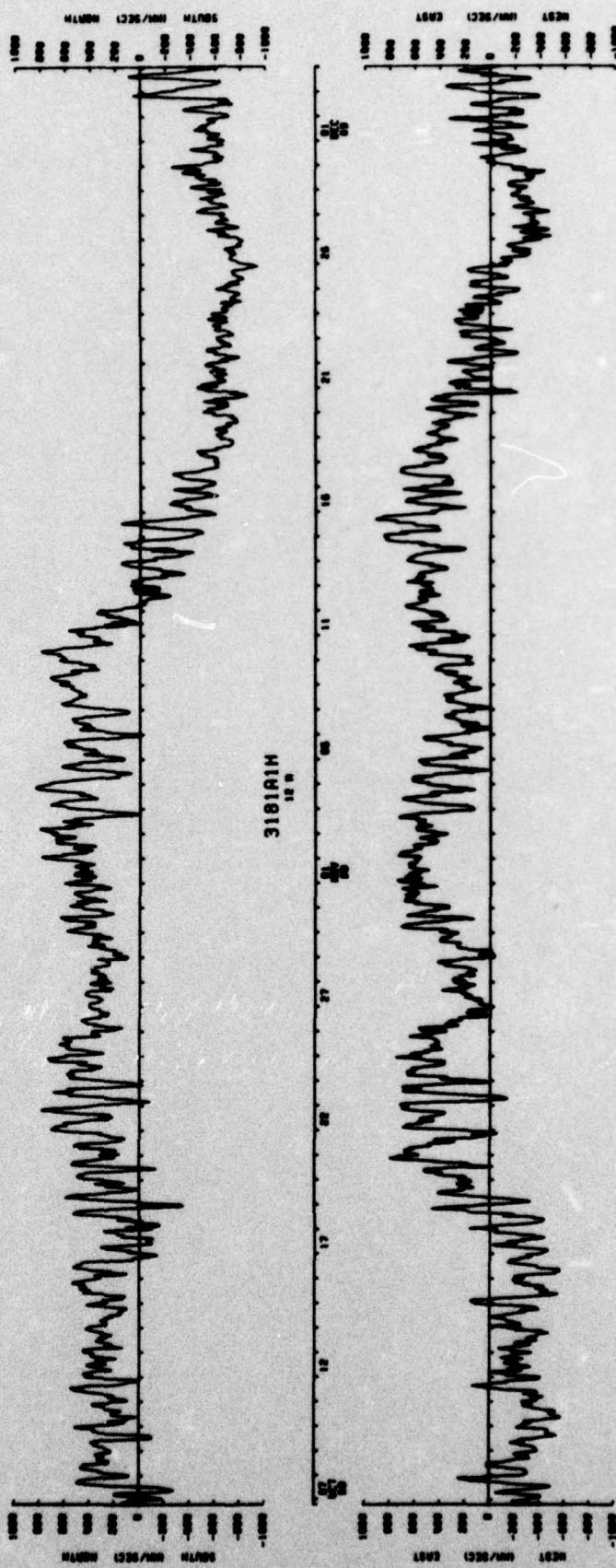
FROM 69-X-06 18.23.30
TO 69-XII-04 01.53.30

DURATION 58 DAYS 7 H 30 M 0 S



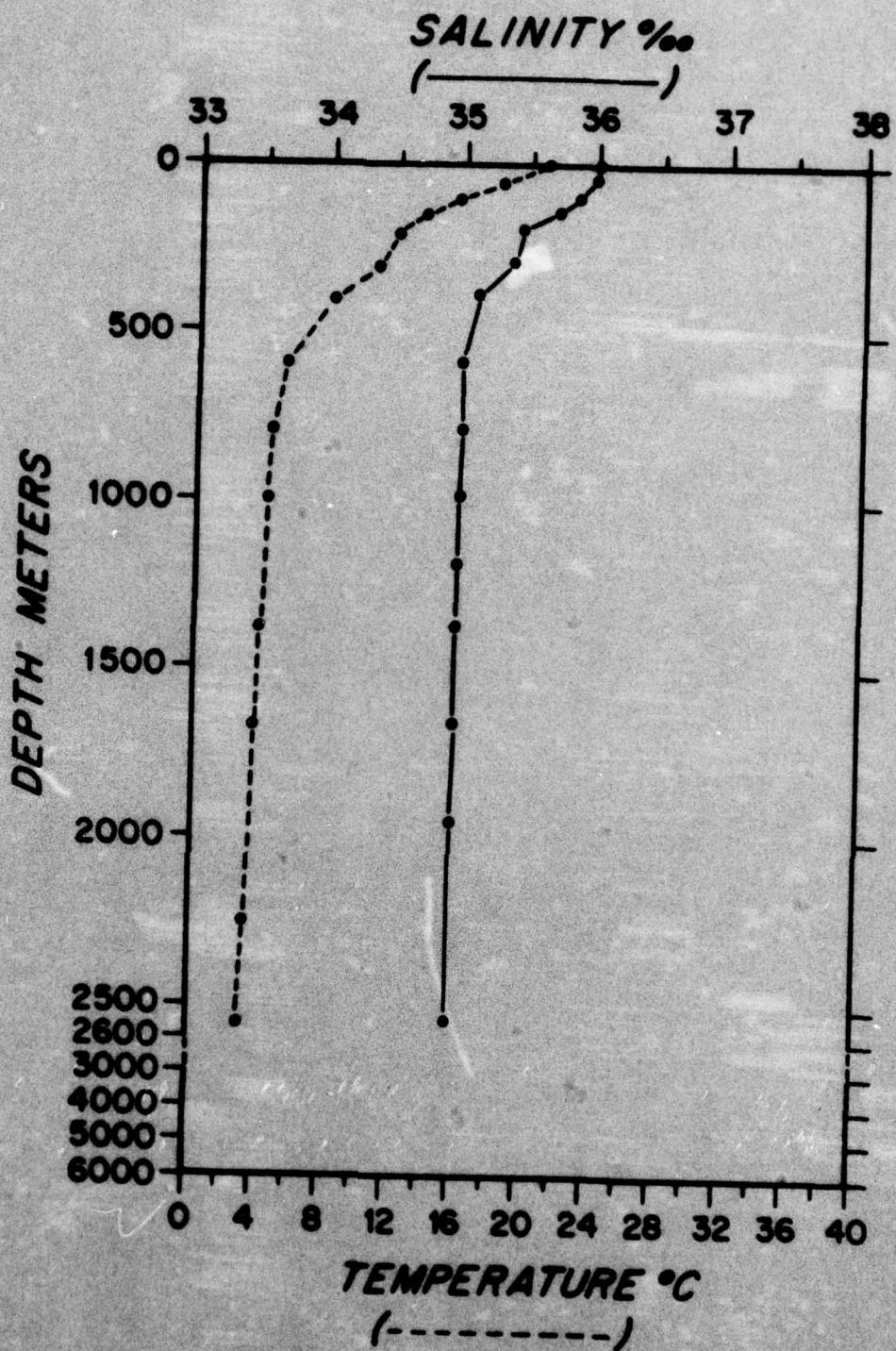


107



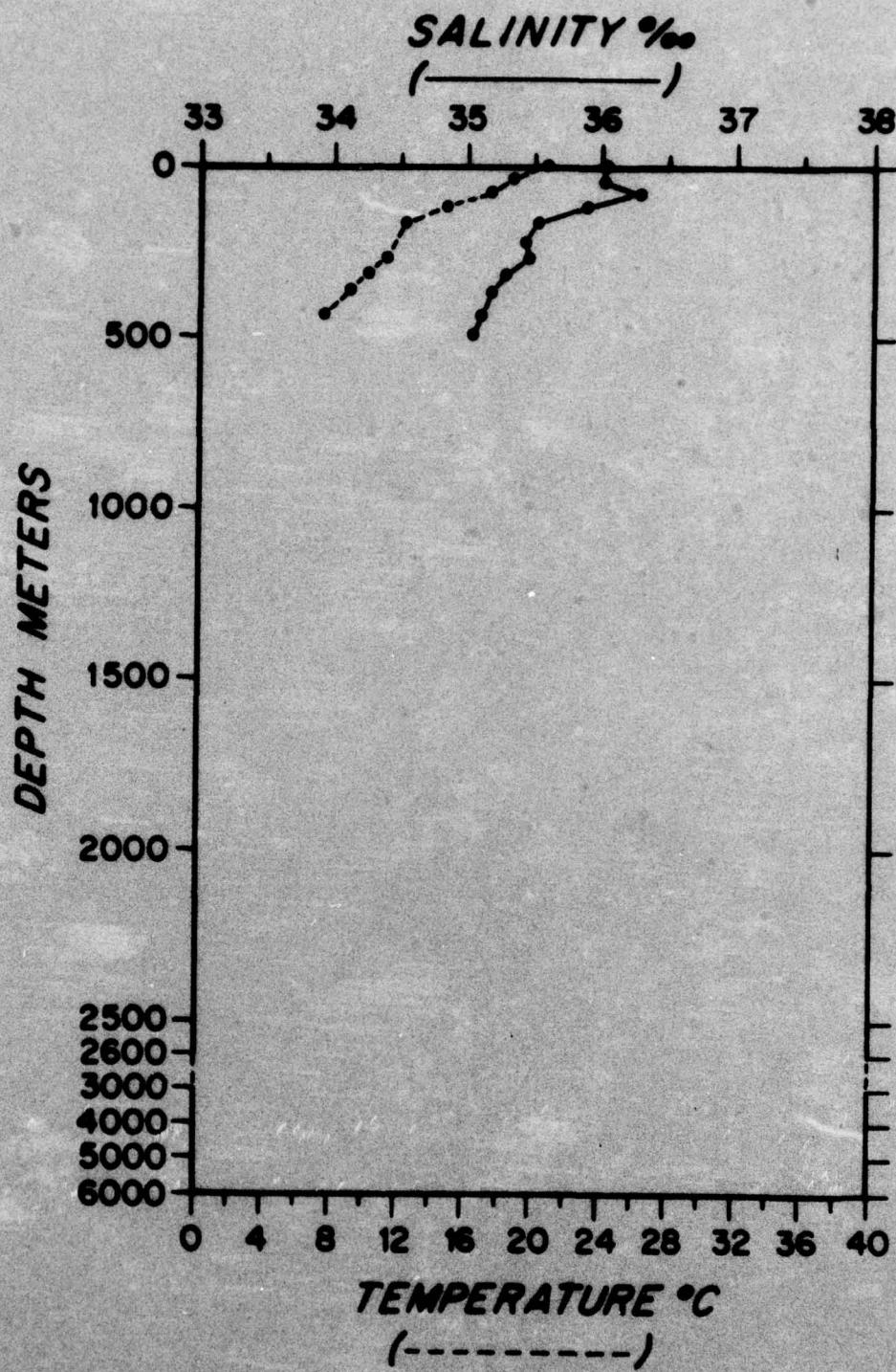
Hydrostation Data

Number	Latitude	Longitude	Page
CI-92-896	39° 07.0'N	70° 00.0'W	112
CI-92-898	39° 02.3'N	70° 02.8'W	114
CI-92-903	39° 09.4'N	70° 06.5'W	116
CI-95-922	39° 10.5'N	70° 01.2'W	118
CI-95-924	34° 01.0'N	70° 04.7'W	120
AN-53-1550	39° 09.0'N	70° 03.0'W	122
AN-53-1551	39° 59.0'N	70° 02.0'W	124
AN-53-1552	39° 12.5'N	70° 05.0'W	126



CI - 092 - 896

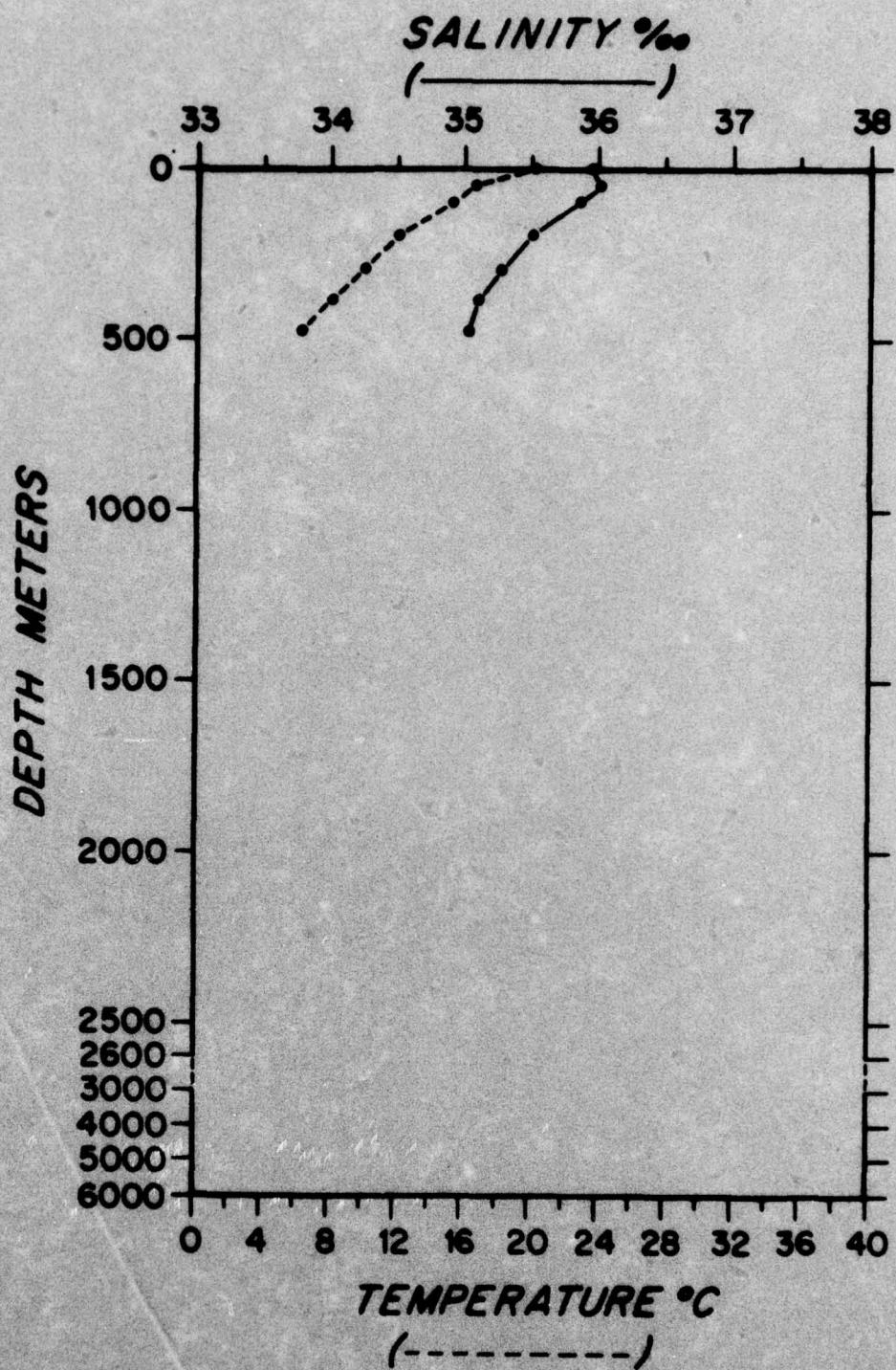
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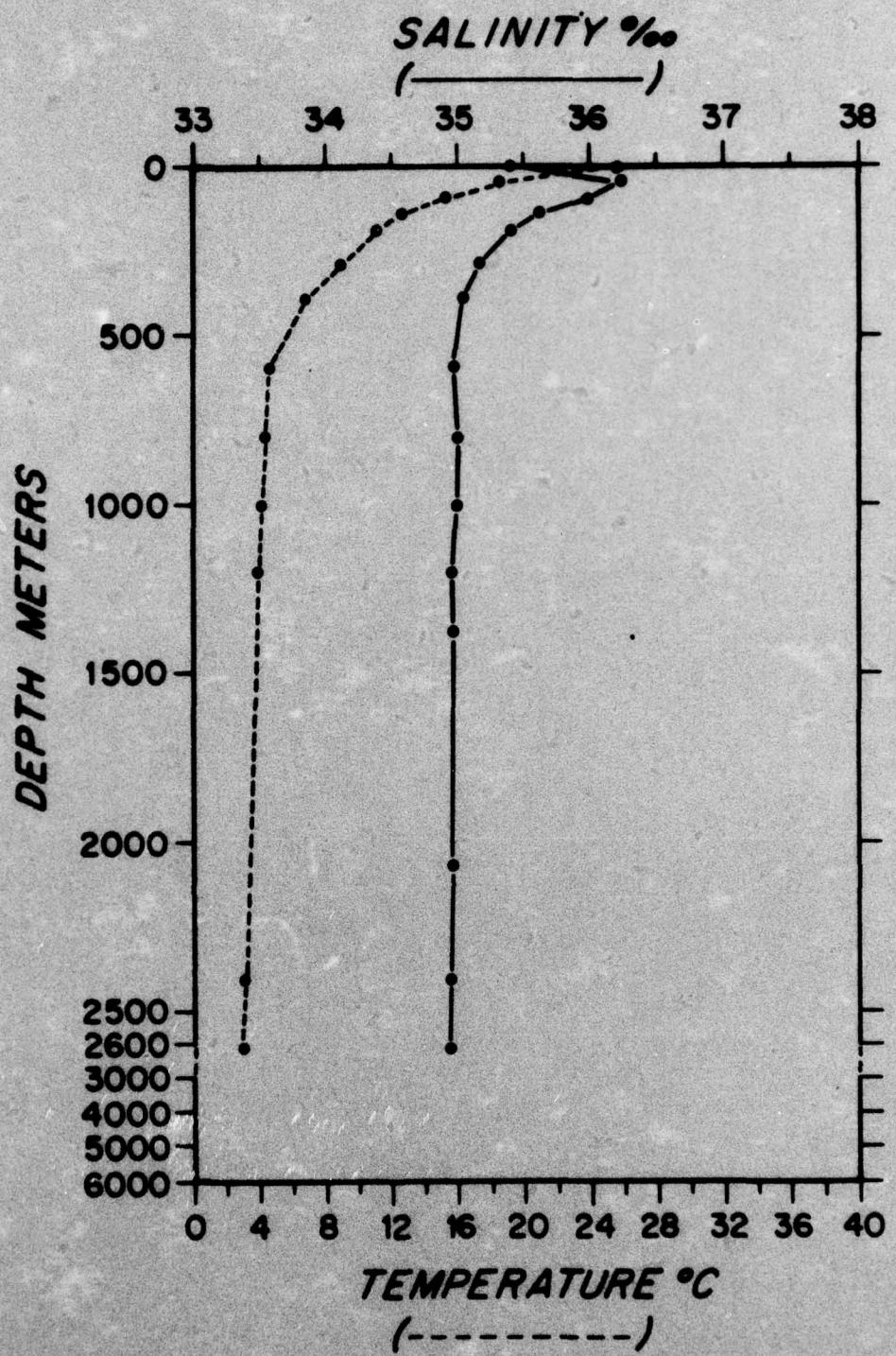
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114

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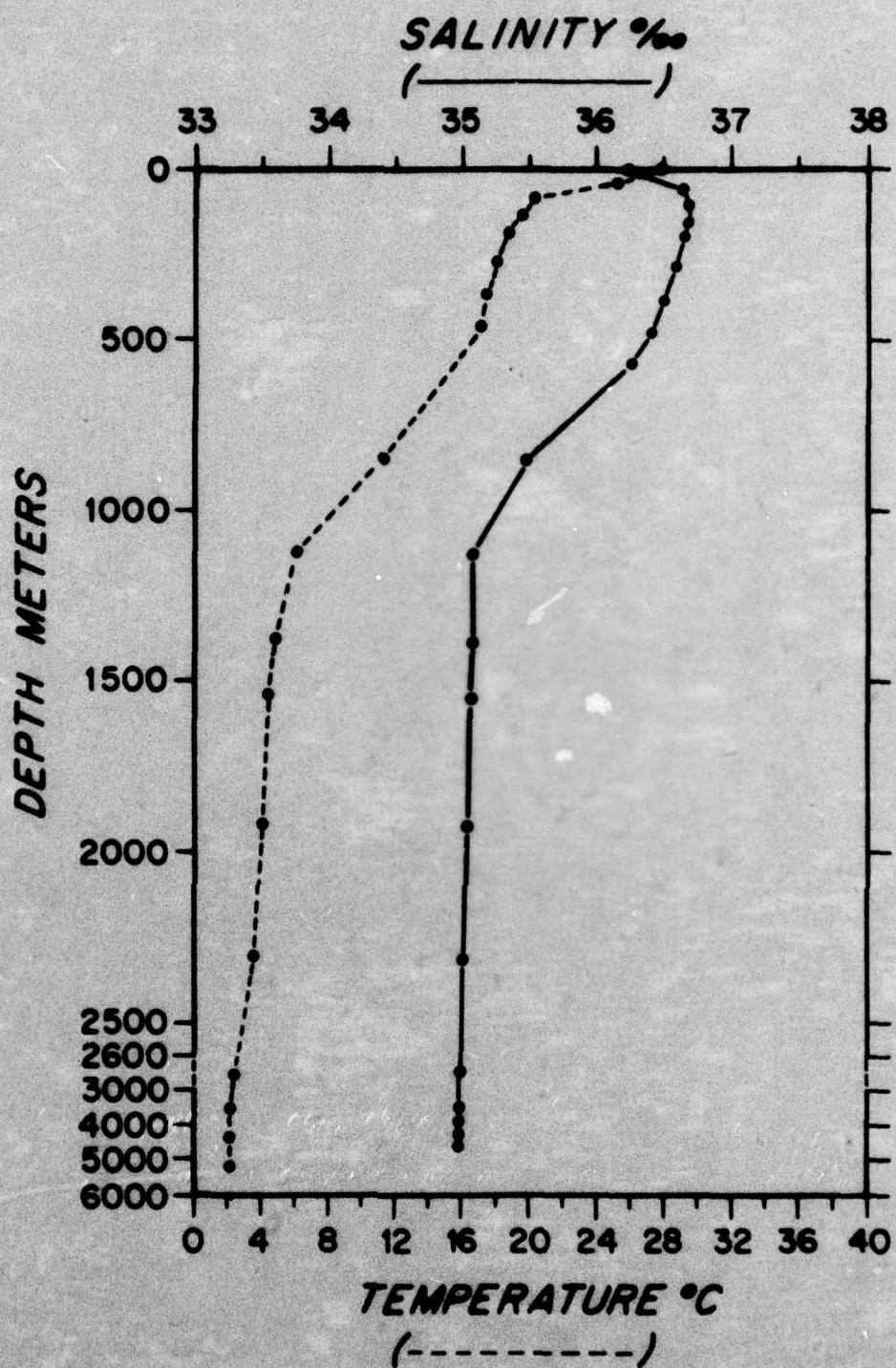
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CI - 095 - 922

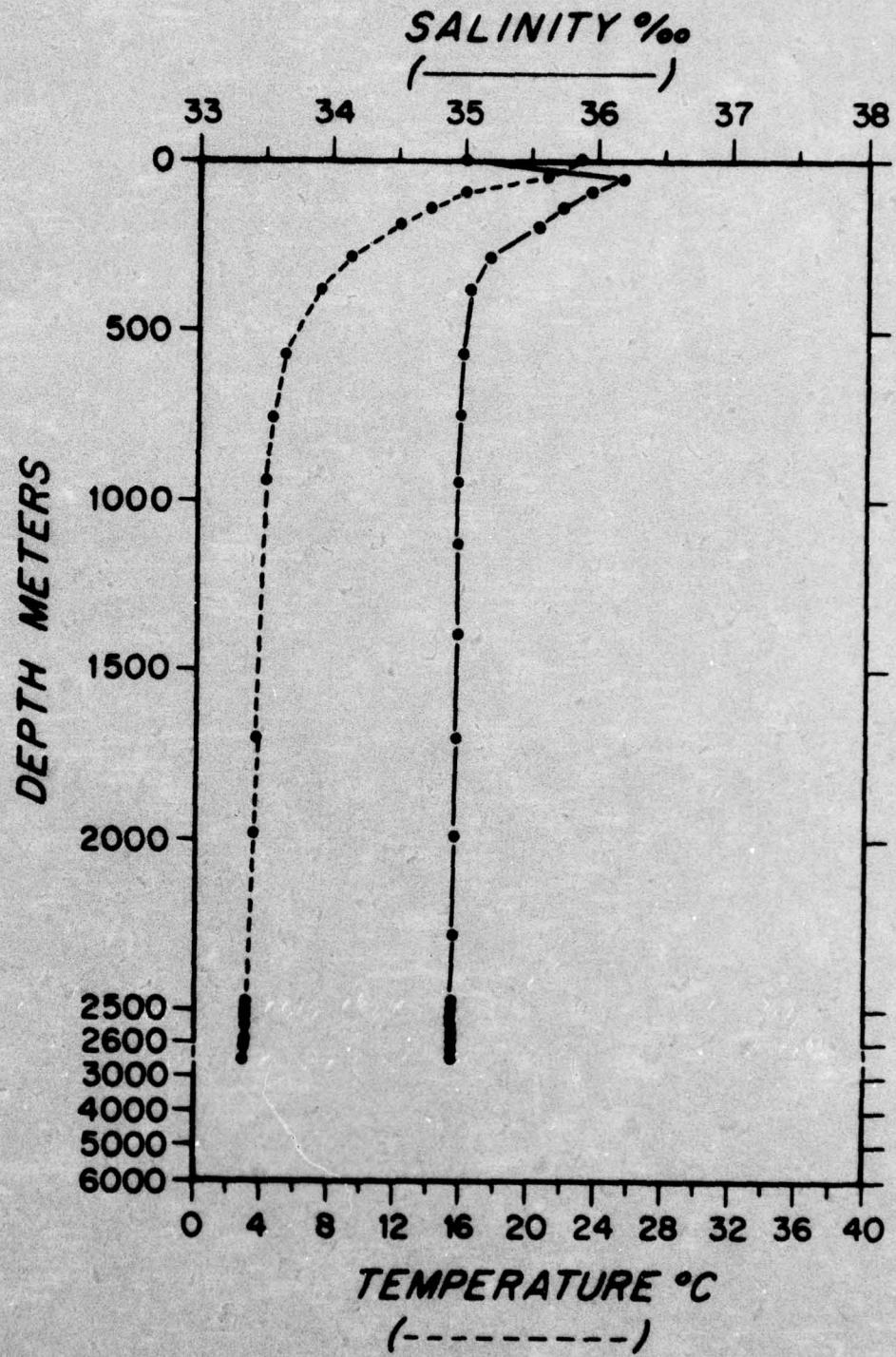
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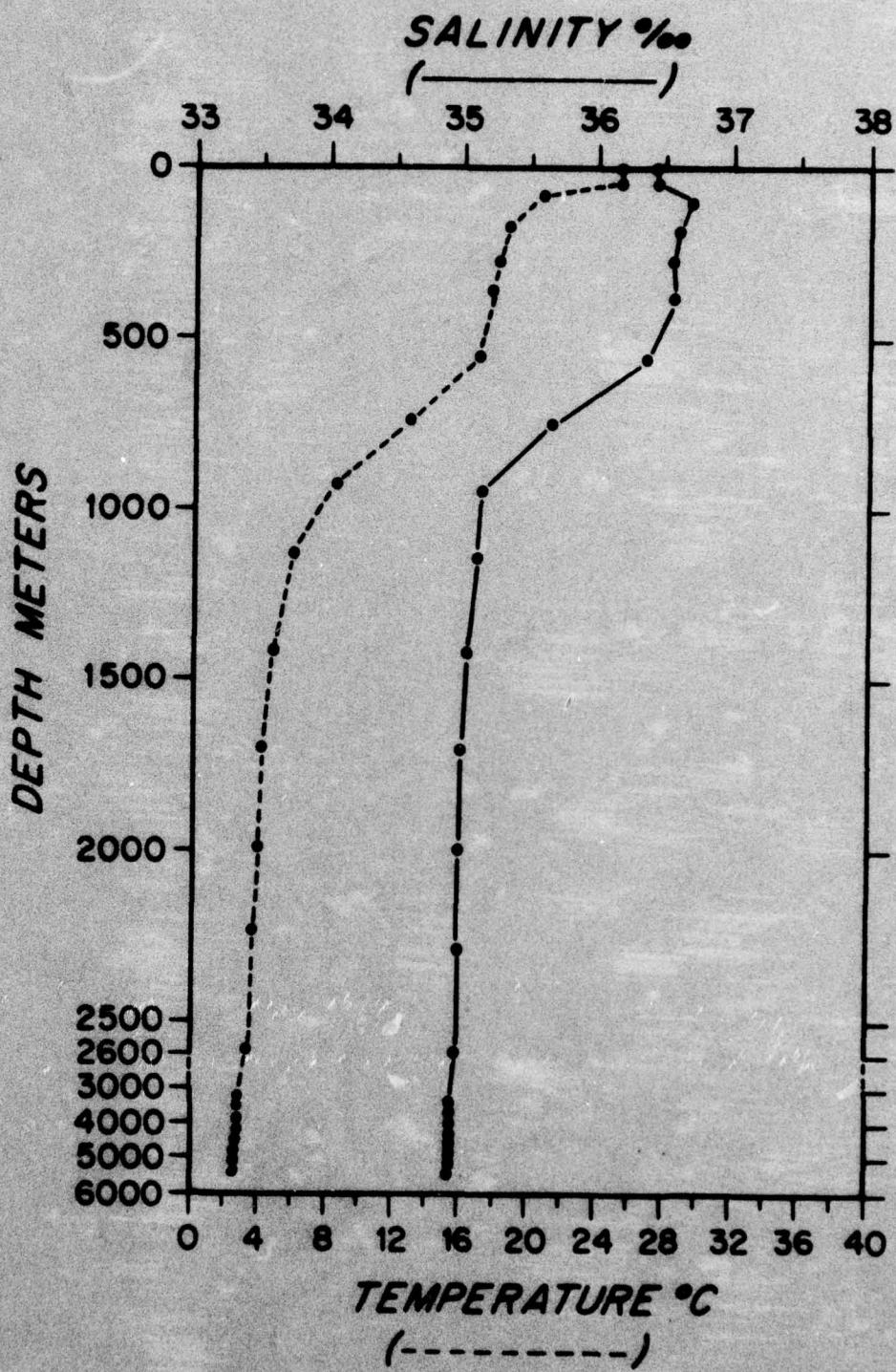


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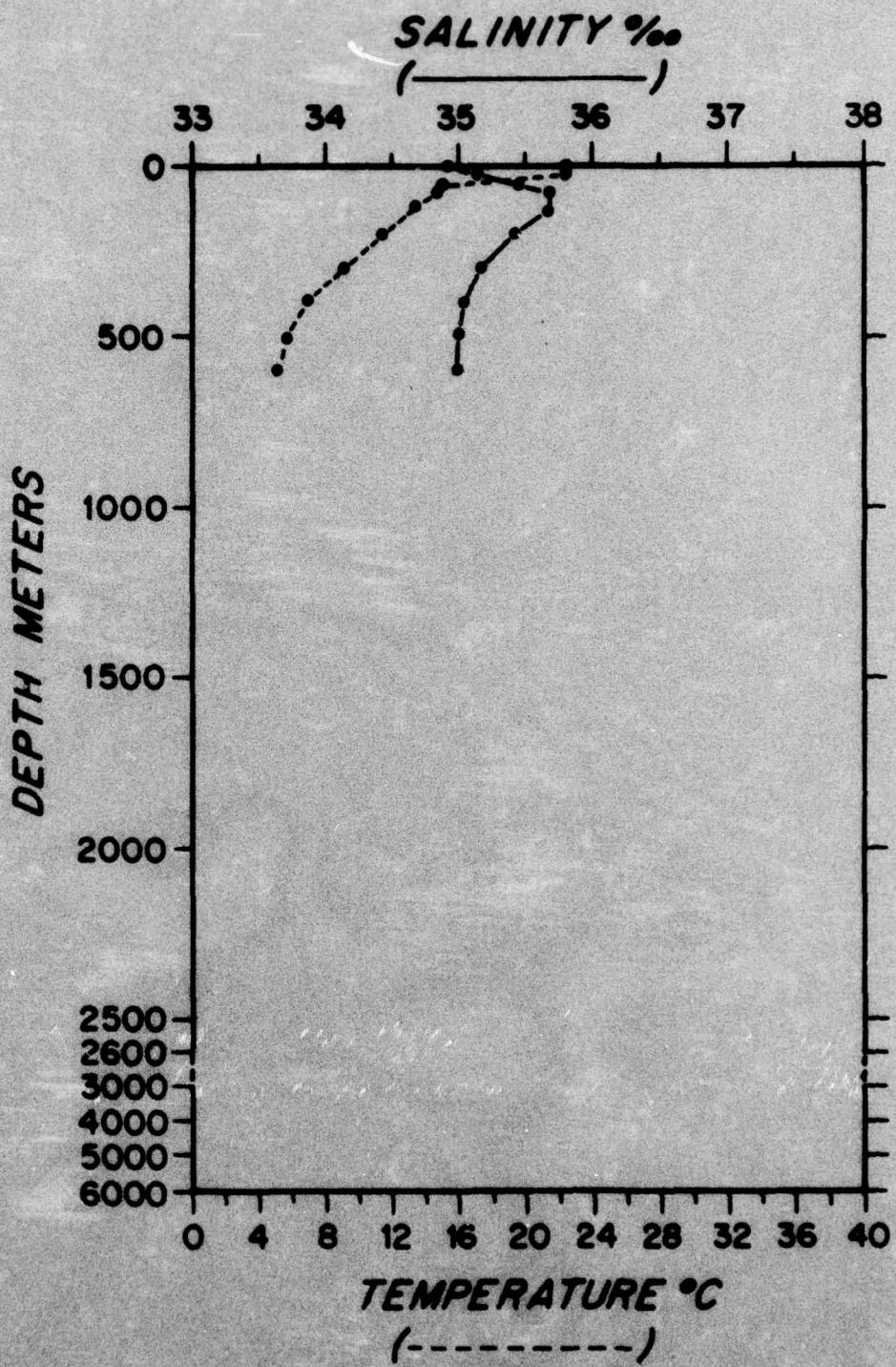
120



AN - 053 - 1550



AN - 053 - 1551



AN - 053 - 1552

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A COMPILATION OF MOORED CURRENT DATA AND
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150 pages. Prepared under ONR Contracts
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Summaries of wind and current measurements
from moored stations gathered by magnetic tape
recording current meters and wind recorders. In
late 1969 are presented also selected hydro-
station data from the same areas.

Averaged wind and current quantities are
presented in computer generated output as basic
STATISTICS, SPECTRUM diagrams, PROGRESSIVE VECTOR
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XI (LATE 1969 MEASUREMENTS) by Susan A. Tarbell.
150 pages. Prepared under ONR Contracts
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NR 083-400.

Summaries of wind and current measurements
from moored stations gathered by magnetic tape
recording current meters and wind recorders. In
late 1969 are presented also selected hydro-
station data from the same areas.

Averaged wind and current quantities are
presented in computer generated output as basic
STATISTICS, SPECTRUM diagrams, PROGRESSIVE VECTOR
diagrams and EAST-NORTH component plots. The
hydrostation data are presented as temperature
and salinity values plotted against pressure.

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